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F. R. Fosberg
 11. 1. 1968

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Collection and Field Note Book

No. 43

(March 11, 1956 --- April 19, 1956)

(36739 --- 36924)

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Miniature Blank

Es
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Cey
East India
Malaya
Male Atoll

PLANTS OF THE MALDIVE ISLANDS
MALE ATOLL

Locality

Occurrence

Date 1956 Alt. m. ()
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Remarks

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A BOORUM & PASE PRODUCT

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Netherlands

1

March 11 - flight from
London to Copenhagen -

Coast of Netherlands
in area before reaching
former Zuider Zee -

Dunes a very small
area with some apparently
evergreen vegetation - this
very sharply demarcated.

A river with protecting
jetty at mouth. A town
~~rather~~ east of it. Back
of this polder.

Northeast of this a fairly
large area of what seems
to be salt marshes or
tidal marshes with
considerable areas of water.

Then vast areas of polders.
Water surface in polder
areas surprisingly large -
canals quite wide.

Soil black. Cultivation drab.

Drainage of Zuider Zee
not at all complete. Large
areas still under water but
also fairly extensive white
sandy exposed flats
not as yet occupied
agriculturally.

Polder pattern - long rectangles
oriented ^{roughly} perpendicular to coast.

Houses scattered along main cross-canals and dykes. Also in villages.

Vegetational successions on recently exposed areas in Zuider Zee would be interesting. Varying degrees of darkening of white sand apparent from high altitudes.

Eastward from Zuider Zee the polder pattern becomes less and less regular, with blocks of polders at varying angles.

To the east of the polder land, ~~is~~ perhaps, but not certainly, near Emden, Germany, is intensively cultivated land above sea-level.

Clouds then cut off visibility.

Friesian Coast - much low-lying land, completely under cultivation. Plots drab colored or black - those plowed apparently black. Roads separating them are mostly white, some obviously from packed snow but others possibly sand. No snow on fields but much floating ice in coastal waters.

Almost no streams in coastal area but some very small ones and a few conspicuous ones a few miles inland. Some of these appear much larger than they are because of broad meandering strips of bottom land, some of it cultivated, some not, along their courses. Inland the fields are more and more conspicuously outlined by bands of snow, these, for some reason (probably drifting by east winds) around the insides of west boundaries extending but diminishing eastward along north and south boundaries. Shapes of plots becoming more irregular across Jutland south of Thorsburg.

A band of floe ice along the shore east of the isthmus, quite wide in places. Some bays partly frozen over. Ice between Funen and small islands west of it mostly frozen over. These small islands entirely cultivated except for small marsh areas around ponds or lakes. Soil black. Not irregular.

Ice between islands broken into vast slabs of irregular size and shape. Some areas completely shattered. Much ice to south of Zealand. This generally more broken up than that farther west.

Western part of Zealand like islands but cultivation pattern becoming more regular eastward. General color drab with shadings of green. Eastern 2/3 of island lightly snow-covered, more so eastward. Soil black where exposed.

A few patches of forest here, apparently deciduous, smaller areas of conifers, these

as angular patches within the larger angular patches of deciduous forest. Forests of irregular distribution probably not 2% of total area seen but locally forming a large part of terrain. Eastward toward south of Copenhagen the proportion of coniferous patches in the forested areas increases, locally to perhaps half.

Much ice on east coast of Zealand. Snow gets lighter again here. Farms here seem to have many small ponds, frozen and snow-covered now, of course. Along the coast an area that may be either lagoon or marsh protected from sea by offshore banks.

Heavy floe-ice southeast of Copenhagen. Between this and shore are concentric bands of a bright green bloom which extend some hundreds of feet out from the shore.

Along the shore at the airport are small patches of *Phragmites communis*. The airport, off the concrete runways, is covered by a very short grass, drab in color now.

Mar. 14 - Zurich to Rome flight

Neighborhood of Zurich airport
pasture with short drab
grass, patches of it plowed,
patches of woods - oaks,
spruces, larches, mixed

In some of the pasture are
abundant small mounds
of earth very much resembling
those made by pocket gophers.

Around the lake, in Zurich
are thousands of gulls -
small, almost white with
black heads.

A vast expanse of the
higher Alps entirely
snow-covered, peaks and
valleys, incredibly rugged.

On the Italian side
the snow gives way to
straw-colored higher
slopes and ridges,
darker steep slopes below
with woody vegetation.
Lakes Lugano, Como, Maggiore
quite blue.

agmox
O

The Po Valley intensively
cultivated. The Po
meandering through
the flat valley with
a broad sandy bed.

Hills at head of south
tributaries, north of
Genoa, are a dull
brown in color, not at
all green.

Area near coast w. of Lake Bolsena
brownish but showing some
green. Hills between there and
Rome completely snow-covered.
15-20 min. n.w. of Rome.

Very little forest - what there
is shows up black.

Approaching closer, the
broad valleys ~~to~~ with
meandering rivers lack
snow, the hills have it.

Then, near Rome, it completely
disappears.

Landscape south of Rome
near airport is almost treeless
except for a few clipped evergreens
along the roads and some
trees in villages. A few
deciduous trees also along roads.
All land cultivated or in villages.
Cultivated land turning green. Soil
red or reddish. Higher hills to
east, snow-covered.

Mar. 14 Flight Rome to Athens

Along the coast southeast of Rome are several large blocks of forest, some of it evergreen, some deciduous with some admixture of evergreens.

Mar. 15 - Flight from Bombay to Colombo ^{14,000'}
^{12,000' high}

Hills around Bombay and southward dry and brown except for scattered palms and other trees and bushes. Some of them, to the south, seem scrub-covered with bits of thicket and forest in some ravines and valleys.

Lowlands, flat or gently rolling, between the hills seem all under cultivation, marked by hedges in some places, others not, but are all extremely dry. Thin mangroves on mud flats in estuaries.

First half hour south along coast - hills and entire coastal area look very dry and brown, but scattered trees, more abundant in ravines, and a few small patches of wood are green. This coastal area does not seem at all thickly populated after vicinity of Bombay is left behind.

Occasional white sandy beaches, backed by green

vegetation, but in most places the brown hills come directly down to the sea, usually ending in low bluffs.

figuring in leaving in from Bombay at 1944
 1/2 hour south - soil definitely reddish. Seem a rather drowned coastline, judging by number of rather complex estuaries. Stream valleys abruptly cut in ~~low~~ what appears to be an elevated coastal plain. These valleys greener than intervening sections of elevated plain, but not really very green. It seems that herbaceous vegetation is all ~~green~~ ^{brown} while woods vegetation is green.

7-7:15 Land forms during next 15 minutes very interesting - sharp headlands abruptly interrupting sand beaches. Steep wave-cut bluffs around these headlands and sections of coast lacking beaches. Valleys here apparently have considerable population but elevated plain very little. Light green which could be sugar cane (or rice) at 45 min. Estuaries become more numerous but mostly with

2:15 -

2:20

2:30

2:40

2:50

abrupt sides, relatively little mangrove except for a few bars. Patches of woods on slopes of ravines, some ravine well marked by woods.

Patches of light green - sugar cane, becoming more numerous in flat bottoms of valleys.

Areas of moving dune sand. Attempts to control them by planting trees. Long sand spits deflecting some river mouths southward. Belts of woody vegetation back of beaches may reflect advance of sandy areas toward sea or cutting back of higher land and its replacement by sand.

Peculiar alternation of ~~sharp~~ pointed headlands with beach continues with beaches forming a greater part of coastline.

General coastline rather straight, except for these small pointed headlands and the numerous estuaries.

Sugar patches more numerous. Patches of woods also becoming more numerous and larger.

2:35 Areas back of beaches wooded. Elevated coastal plain lower. Large patches of wood occasional on it, otherwise it is still drab a reddish in color.

Goa. - large estuary.

Country generally more wooded here, but fields and open land drab.

Long straight beach some miles long south of Goa. Some loose sand behind it, partially tree or shrub covered. Then

another estuary with sugar cane. ~~Then a large~~ some small islands offshore.

2:35 - Country becomes rougher and hills scrub covered.

2:45 The hills seem wooded with drab fields on more level places.

Many large estuaries.

2:50 Lower country and again more open and brown. Many and complicated estuaries.

2:55-3:00 Coastal plain becomes lower and more maturely eroded. Southward more and more interrupted by low rounded hills which are green with reddish soil showing

through. Estuaries and flat fields between there. Some fields are drab, others low and bright green - rice? Small patches of wood and clumps of trees abundant.

3:00 -

3:10

The small hills become so abundant that they make up most of the country. Their tops are in places bare and red, probably badly grazed. Several winding estuaries between them. Cultivated land between the hills becoming divided into small lots separated by hedges or strips of vegetation, at least. This area rather densely populated. Drab color of fields evidently stubble or grain - at least all hills between are red. Soil in these fields, though, may be gray-brown, as suggested by some that seem to be plowed.

3:15

Many fields green, especially near stream courses.

3:15

Two large estuaries

heading up into meandering sandy beds. Separated by complex of thinly vegetated red hills with fields, green and drab, and patches of wood between them.

Extensive offshore banks at mouths of estuaries.

A city at mouth of south one of the two.

Then a long, almost straight, slightly echeloned beach southward for miles, some dark vegetation at top of beach, then narrow strip of green fields. Then back of this the same complex of low rounded reddish hills, here thinly or scarcely vegetated, with fields and patches of woods between. Some small

3:20

estuaries southward, mouths deflected by long sand spits. Deflection southward but actual opening north of southern end of sound in each case. Then one with mouth deflected northward in same manner, this a fairly large one.

3:22

South of this the dissection

becomes obscure and the land back of the coast is largely a rolling red plain, cut by fewer ravines. Vegetation very thin, but with woods in low places and along ravines.

3:25

Just south of this a broad sandy coastal strip in front of the slightly elevated plain. Sandy area cultivated, with strips of trees (wind breaks?) parallel to beach.

Then long stretch of sounds, cut off from sea by long spits or banks. This backed by rather low coastal plain, this wooded in strips parallel to coast, rather irregularly, cut somewhat by winding estuaries. This ends southward in a hook-like hilly headland pointing somewhat southward, with again a long beach south of it in a conspicuous echelon arrangement.

3:27

Large estuaries and sounds here also, but visibility now very poor. This is probably about Cannanore

followed by Tellicherry and Mahe. But plane is too far offshore for good visibility. There are red bedlands and estuaries, with more vegetation than northward.

3:33

As far as can be seen the coast is predominantly wooded from here on. Mahe is perhaps the dividing point between a dry and a humid coast.

3:43

Approaching coast again somewhat - visibility poor. Landscape again somewhat dry, but with considerable expanses of forest.

4:17

Long straight beaches, backed in places by dark vegetation, in places by sounds. ~~Back~~ Back of this coastal strip are hills with large areas of green (rice) between them, some woods, some open brown grass on hills.

4:50

Approaching coast again but visibility very poor - a gray-blue haze. Evidently long offshore spits and extensive sounds, but details not clear.

Apparently this is Cochin (Malabar).

4:25

Southward a low coastal area, partly under water (?) partly cultivated. Inland apparently some open sand, partly vegetated, but this not clearly visible.

4:47

Large densely cultivated coastal plain area, considerable vegetation. Large lake inland from this (~~See~~ Venbanad?) and inland from that extensive flat areas, cut into large angular blocks, some flooded, some brown with scattered green patches separated by broad canals and estuaries. These blocks apparently cultivated, as they are subdivided into rectangular patches.

4:51

Southward another lake apparently divided into fish ponds, with a town on an island in it. South of this an intricate mosaic of patches of trees and of cultivation, ~~to~~ to east wide green fields (sugar?). Southward this pinches out. Coastal plain is trees and cultivated patches.

4:15

in a rather regular north-south pattern. Some canals and roads following this pattern. Trees more abundant southward. These patches of trees not dense - some ground to be seen between them usually. Soil drab to reddish, becoming redder southward. Then more estuaries and the north-south pattern breaks down, becomes irregular, with plantations - grid-arranged, of something (rubber?) and then a large irregular lake. Then red soil, rolling, with winding strips of flat light drab soil - old estuary courses? The whole sparsely and very irregularly tree covered with many patches of cultivated land.

4:17

4:20

Large estuaries and coastal lakes, completely separated from sea by spits or bars - no openings.

Country generally red, with some vegetation, except for drab open meanders and swamps which are flat and treeless.

4:23

Beach very straight for miles, in places backed by water, in places by what appears to be scrub or low forest.

Then a broad sandy(?) apparently unvegetated area, perhaps partly cultivated, back of beach. Back of this a complex of red low rolling land with meandering flat old estuary courses - the red soil thinly vegetated with woody plants, the meanders drab, dry grass or cultivation.

4:26

Then this complex comes immediately to the coast and the coast turns very slightly more eastward, is predominantly wooded with red hills showing through to some extent. Then another long straight beach. The same pattern (4:20-4:26) repeated somewhat, but with not so much flat coastal strip, & red hills closer to coast. Meandering flat valley bottoms, drab in color, conspicuous between them.

4:30

Hills come down to coast again and another gradual bend eastward.

but near beach is continuous.

The sparse vegetation of these hills looks very over-grazed.

4.33

A town, and patches of more dense wood and open scrub areas back of coast.

4.35

Then a hook-like headland with a town, again the coast trends more to east, followed by a long broad straight beach. Back of this much open grassy and scrubby country, some cultivation. The red hills gone or obscured.

4.38

A sharp bend eastward followed by an irregular coastline.

To eastward broad red plains with a few scattered dark spots of vegetation as far as visibility goes.

Call
Chennai
(and another)

In distance a sharp land hook like point followed by another sharp bend and an irregular coast trending northward (?) (navigator not certain if this is Cape Comorin or not!).

Mar. 15 - Colombo area almost solidly planted to coconuts. Planting varies in regularity from patch to patch. Some rice fields also. Some other trees mixed with coconuts. A few patches of woods without coconuts. Rice in various stages - some has been harvested.

Pandanus and Acrostichum on low wet ground near airport.

March 16 - Colombo

Rocks at Mt. Lavinia hotel covered by a short growth of algae - Ulva.

Crows abundant, dark gray.

Cultivated plants seen in Colombo:

- a *Cocos nucifera*
- c *Pisonia grandis* var. *alba*.
- o *Delonix regia*
- c *Erythrina variegata* var. *orientalis*
- o ~~*Gesneria*~~
- o ~~*Disanthus caryophyllus*~~
- c *Cassia fistula*
- c *Plumeria rubra*
- c *Plumeria* sp. "Singapore"
- c *Casuarina equisetifolia*
- c *Artocarpus altalis*
- o *Lamanea soweri*

- ~~o Gladiolus~~
- c *Cordia allamanda* variegatum
- o *Glinicidia isobrium*
- c *Mangifera indica*
- c *Acalypha trispida*
- ~~c *Antirrhinum* sp.~~
- ~~c *Gladiolus* (ornamental hybrid)~~
- c *Thespesia populnea*
- c *Pseuderanthemum carnathanii*
- o *Bougainvillea glabra*
- c *Bougainvillea spectabilis*
- c *Cordia papaya*
- o *Hemigraphis repens*
- o *Ipomoea carnea*
- o *Polyscias fruticosa*
- o *Muntingia calabura*
- c *Hibiscus* - ornamental hybrids
- o *Malvaviscus* sp.
- c *Chrysalydocalypus lutescens*
- c *Tabernaemontana coronata*
- o *Stylosanthes maculata*
- o *Ribes discolor*
- o *Cycas circinalis*
- o *Cycas revoluta*
- c *Caesalpinia* spp. *fulcherrima*
- c *Acalypha amentacea* v. *willdenowii*
- c *Agave* sp.
- o *Canna* - ornamental hybrids
- o *Ficus religiosa*
- o *Nerium oleander*
- o *Thevetia peruviana*
- c *Passiflora* sp. (dark purple)
- o *Euphorbia pulcherrima*
- c *Ipomoea erecta*

- o *Polyscias tincochleata*
- c *Allamanda cathartica* v. *hendersonii*
- c *Dieffenbachia maculata*
- c *Coleus scutellarioides*
- o *Euphorbia "splendens"*
- o *Caladium bicolor*
- c *Musa sapientum*
- c *Catharanthus roseus*
- o *Polyscias ficifolia*
- o *Pseuderanthemum carnathanii*
v. *atropurpureum*
- o *Adiantum* sp.
- o *Nephrolepis* sp.
- o *Thunbergia speciosa*
- o *Ixora coccinea*
- o *Ixora alba*
- o *Mamboi esculenta*
- o *Ciba pentandra*
- o *Tamarindus indica*
- o *Cymbidium* sp.
- o *Barringtonia asiatica*
- o *Tagetes* sp.
- c *Lantana camara*
- o *Tectona grandis*
- o *Terminalia catappa*
- c *Artocarpus integer*
- o *Strobilanthes*? (salmon color)
- o *Pisonia grandis* v. *grandis*

Colombo is, in general
very well covered by
trees. Most of the city,
except the downtown or
"Fort" area and the actual
water-front and railroad
yards and market
area looks green and
wooded from the air.

Mar. 16 - rail trip from
Colombo to Kandy

Flat country outside
Colombo - open low pastures,
some cultivated plots, about
1-3 dm. above water table.

Ponds with a small *Pandanus*
and *Hibiscus tiliaceus*.

Home sites and small
villages with coconut
trees and other palms, mango,
breadfruit, various other trees.

Extensive marshes with
open water completely covered
by an unidentified floating
plant - brownish green, patches
of *Cyperus*, *Cyperus*, *Nymphaea*
thickets with *Cerbera*,
Phoenix sp. *Sternandria sonnerati*,
Lantana camara.

Rice fields in various stages
A little *Calocasia* along edges.

Ragama sta.
Areca common. Rice fields.
Coconut groves.

Large rubber plantation.
Low rolling hills.

Daturawatha sta.

Coconuts and misc. cult.
trees on hilly ground, rice
patches on flat low ground.

Salweenia

15 mi.
7 mi.
2 mi.

photos
looking
east

Jenemulla sta.

Rice follows winding valley
with rice patches, bright
green. Much very low
rolling hilly country with
houses, small patches of
rubber, coconuts, ~~lots~~ *Areca*,
Anacardium, mango, *Mussa*,
Lesbania grandiflora.

Gampaha sta.

Carabao grazing in
rice stubble fields, cattle also.
Rice here all harvested.

Breadfruit occasional.

Rubber and coconuts occupy
higher land almost equally.
Proportion of high ground
and rice about equal.

A little bamboo.

Pandanus (?) along watercourses.

Gliricidia common.

A large *Caryota* (*arens*?).

Kelnewala sta.

Country essentially unchanged,
more coconuts, less rubber.
perhaps more rice.

20 mi. ~~from~~!! First real
hills 50 m. or more high, abrupt.
covered, except cliffs, by
woods, thickets and cultivated
cultivation - mostly
coconuts and bananas.
Myrtaceae and *Juniperus*.

photos
looking
east

40 km. sizeable rubber plantation on left.

Mirigama Sta.

Country essentially flat again, but hills in distance.

Small patches of pineapples. Much tangled second growth on hills. Rock exposures common. Some forest. Coconuts on lower hills. Much less rice. Coconuts here without undergrowth, cattle grazing.

Ambepussa Sta.

Peltophorum in village. Houses - larger - roofed with tile, smaller thatched with coconut leaves. Mud walls.

Leave higher hills behind.

Little rice, mostly coconuts.

Maha River

Bajomawa Sta.

Higher hills - forest on top cleared on slope.

Alawwa Sta.

Country more hilly.

Lowest rock common.

Mostly coconuts, no rubber. A little rice in flat bottoms.

Polgahawela Sta.

First view of real mountains in distance.

More rice, all stubble but flooded. Higher ground all in coconut plantations. Steep mountains in distance on left wooded. Bananas ^{abundant} ~~common~~ around dwellings. Papayas common, breadfruit occasional.

High hills, forested on top, clearings and second growth, thicket on slopes. Mainly rolling low hills with coconuts. Still along Maha River. Some rubber plantation again, not very large. Area common.

Bamboo still occasional, 2 or 3 kinds.

Same pattern of coconuts on rolling land, rice on flat bottoms, in patches bounded by levees.

51 mi. good view of mountains in distance at night, very rugged.

Rambukkana Sta.

Xanthosoma and *Colocasia*.

Rice all stubble.

Area abundant.

1956 Ceylon

Enter mountains.
Slopes with mixed
secondary forest and
coconut groves. *Artocarpus*
common, at least 2 spp.
Area still very common, ^{also} ~~also~~
also bananas. ^{terraced}
rice in small valleys.
First patch of *Imperata*.
Cela pentandra in
small patches.
Jatropha curcas hedges.
Some rubber, rather
young trees.

Mountains in places
very abrupt, others more
gently sloping. Covered by
second-growth forest,
but with clearings and
shifting cultivation even
on steepest slopes and
clear to tops. A few small
areas of grass on some
slopes.

Coconuts still very common,
but not in highest places
or steepest slopes. Breadfruit
~~very~~ common also.

Alocasia in wet spots.

57 ⁱⁿ scenery magnificent.
Spectacular rice terraces.
Imperata rather common

Alagalla Sta.

Magnificent rice terraces
here, compare very favorably
with Banton. Walls of mud
held by a thin ~~to~~ sod.
Themeda occasional.

Zithonia diversifolia
well established along
railroad.

Some rubber on even rather
steep slopes.

61 mi. A giant bamboo
here, rare. *Lamanea*.

Balana Sta.

Mostly second growth
with scattered small
patches and clumps of
bananas. Rubber on
less steep land.

Rubber trees rather
sparsely leafy at this
season.

Still plenty of coconuts.
Citrus, breadfruit, mango.

Bare gray rock cliffs.
Some epiphytes in trees.

Slopes rocky. Much
Imperata on soil-covered
slopes. *Gavillea robusta*
suddenly common,
~~evidently~~ on tea shade;
— tea plantations also
appear here. ~~Kaduga~~

1956 Ceylon

Kadugannawa Sta.

Some rice harvested, some almost ready.

Level valley between steep mountains. Slopes in tea. Bananas abundant coconuts less so.

Gerbera patches.

Bambos common, Areca also breadfruit. Glinicidia

Railroad goes down grade from here.

Small herons common here, flying at sundown.

Coconut groves common locally.

Where slopes are too steep for rice terraces tea is planted. Clean cultivation of tea seems to encourage erosion. Soil is red.

Streams are thickly beset by rapids.

Paradenya junction.

(Surotenia)

Lycopodium
OpuntiaFilicium
decipiensTallennanensis
dischidema

Mar. 17

Udawatthakele Forest
above Kandy - walk with C. H. HolmesForest of *Artocarpus nobilis*,
Litsea macrophylla,
Pterocarpus dalbergioides,
Elaeocarpus spp. *Artocarpus*
integer, *Handersonia indica*,
Myristica dactyloides, *Macaranga*
peltata, *Myrsine* *peruviana*.Covered by *Scindapsus*
amurensis and another aroid
on ground as well as
on tree trunks.Regeneration of *Litsea*
is very rapid.
Trees to 6' high in 35-40 years.

Calamus, Caryota

Macaranga and Trema
are primary colonists in
openings in Ceylon - HolmesGreat numbers of fruit bats -
eaten by some and believed
to be one for asthma.
Small group of brown monkeys.
Fruit bats injure trees where
they roost. *Artocarpus* and *Trema*.
Hygrium nesianum always
affected by rot.

not identified various birds. Very tame. Not hunted.

Pterocarpus petals falling like rain. Cover ground. Odor spicy, like *Acacia parsonsiana*. (cycle - loose leaves. Then produce new leaves and flowers. cover ground with petals, for a couple of weeks. Then petals turn black. Then a rain of green fruit, then one of ripe fruit.)

Trunk fluted, rust color.
Neolindera cassineifolia

Canthium decocum

Lannea grandis

Elaeocarpus serratus

Pterospermum canescens

Mangifera indica

Ficus hispida (app. local)

Wendlandia rotunda (in open)

Acronychia laurifolia (understory)

Mallotus (in open)

Garcinia gambuziana (under story?)

Arysta acens

(used for palm sugar, toddy, and)

Ferns

Blechnum

Angiopteris

Polypodium

Phlegopteris?

Leandrocalamus giganteus

This forest is an old growth secondary forest, with some trees up to a meter or more dbh. The canopy is irregular and not complete. Many of the principal trees are exotics, especially mahogany. Second story incomplete and irregular. Lower woody layer principally saplings and seedlings of most of the trees, ~~especially~~ especially of Mahogany.

Holmes says that this species is becoming more and more abundant in the wet evergreen forest and will probably dominate this type all over Ceylon within 5 years.

Artocarpus nobilis is one of the common trees. The leaves of mature trees are entire or very slightly lobed, stiff, crisped. Seedlings up to 1-2 m. have deeply lobed leaves resembling those of *Artocarpus altalis*.

Mar. 25 - bet Kandy and
Kurunagela

Rubber plantations
some of which have
an under story of *Theobroma*.
Tea plantations in Kandy
area are mostly in very
poor shape or abandoned -
given over to rubber or to
general mixed cultivation
of coconuts, breadfruit, jack,
areca, mango, banana,
cassia, *Theobroma*.

Xylocarpus parvifolia with
white trunks, seems almost
dominant in evergreen forest
lowland type on steep upper
slopes of mountains ~~above~~
Kurunagela.

Just above Kurunagela
on flat land and extending
to Chilas & Nagambho the
major crop is coconut.
Still some rubber and rice.
Under coconut trees a thin
sod of *Axonopus compressus*.
Used for grazing and sows
to reduce erosion.

Samanea a common shade tree

Mahoe *seeds*
abundant.

north road to Pambulla
Artocarpus integer plantations
mixed with many
other trees, also *Vitex*
plantations. *Luribenia*
used as nurse crop,
but has in many places
shed out the jack trees.
Plantations date from
lat '20s and early '30s

Land taken out of
shifting cultivation "cheru".
Trees up to 3 dm. diam. to
15 m. tall, extremely variable size.
Soil yellowish brown, gritty.
Shrub layer very sparse,
of *Melastoma*, ~~*Psychotria*~~ *involucrata*,
etc. *Remocarpus*, *Bermya* saplings.
Ground layer almost absent,
small grasses, seedlings, etc.
but ground covered by leaves.
Where jack and *Vitex* planted
together, *Vitex* will suppress
jack. *Luribenia* also
outgrows both *Vitex* and jack.

At this season *Vitex* and
Luribenia are both almost
leafless, so the thin under
growth looks odd, but the
rest of the year the canopy
is almost complete.

Moist area

In the older stands - jak, teak (later underplanted with mahogany, the lower layers much denser and not very well differentiated. Here some *Chloroxylon swietenia*, *Semecarpus obscura* (local endemic (fair sized tree)).

Lumnitzera has equalled or overtopped the other trees even though planted later. Reproduces well.

Chloroxylon seedlings appear in dry season, die back to ground in wet season, repeat this many times, till an opening appears, then it grows rapidly to a large size.

Another stand of mixed indigenous species.

Unsuccessful when canopy was left intact. When opened by half more success. started 1936.

Here, with *Filicium*, *Canarium zeylanicum*, *Ailanthus triphylla*, *Artocarpus nobilis*, *Macaranga peltata*, *Nephelium lanceum*, *Euphorbia*. The large trees remaining are 30-60m. tall, lianes were cut. planted layer now 10-15m. and the dense

undergrowth - not sharply distinct from it.

Another stand where jak was planted close together, not thinned for a long time, then thinned. The sudden opening led to dying

back of the remaining trees and entry of many secondary trees - *Macaranga peltata*. A small-leaved *Oplismenus* forms a thin ground cover. The forest now very thin. Flora collected here.

A stand of ^{planted} mixed native species without any canopy tree left - is a bit thinner and lower than the planted layer in the stand under the canopy. Trees more slender and more sparsely leafy, but closer together. Leafing very crowded but stringy.

Chorizanthe tabularis - planted in open is seriously attacked by *Hypoclea* in shade not.

This is all in Holmes Dry forest of Wet evergreen. I would call moist.

feathered termite nests,
crucial, to 2m.

Mesua ferrea will not
become established in open.
Needs nurse tree.

Intocarpus lapurha
small leaved, deciduous
native to Ceylon.

Gmelina arborea in Ceylon
is a very small tree, the
form imported from
Burma is much
larger and is being
planted here.

In some trees, esp. jack,
if a branch breaks off,
the wood may be attacked
by *Eutermes greenii*. After
this continues the tree
~~ess~~ shows a heart
rot, with lesions
in which maggots
live. Form large brown
streaks in trees.

Canarium zeylanicum
is losing its leaves now.
An enormous emergent
with large buttresses.

Vitex pinnata needs
for first year, then if
shade not removed
will die out. Naturally
comes up in gaps. Shade
there provided by shrubs.
Can grow in open but then
is very branched.

Wood of *Celtis cinnamomea*
has very bad odor. When
natives are angry with
each other, they put a
piece of this wood in
the well, rendering water
undrinkable.

Strychnos nux-vomica
occasional. Bark very
bitter, ~~per~~ taste persisting
in mouth.

This forest generally has
few epiphytes, except
thin mosses and corticolous
lichens. Lianas and
creepers adherent to
trunks, on other hand,
abundant.

1956 Ceylon, Kandegamulla
halfway bet. Pundarik and
Metti Kankaniyamulla
Forest Reserve

Wet evergreen forest
but rather heavily
logged out. Very dense
undergrowth due to felling.
Abundant seedlings
of *Swietenia macrophylla*.

On one side of road most
of the trees are mostly *Swietenia*
about 20m. tall. Under-
growth not well differentiated
into layers but very
abundant at all heights.

On other side mixed
native forest but very
degraded, with secondary
species, as *Macaranga*
peltata, *Grewia*
etc. growing side-by-side
with *Dipterocarpus zeylanicus*.

A dense patch not
logged recently. trees
to 10-15 m. canopy very
irregular but heavily
covered by lianas
layering not clear.

A naturally regenerated
plot, done 1938-42,
~~now mixed~~ then the
canopy removed.
now mixed ~~to~~ secondary
forest with very dense
stand from saplings
1-2 m. to small trees
to 15 m. and 1.5-2 dm. dbh.
no distinct layering,
practically no ground
cover, but abundant dead
leaves, esp. *Artocarpus*
nobilis. The percentage
of economic species increased
because others were cut out.

Artocarpus nobilis
Schizophrum roxburghianum
Vitex pinnata
Chaetocalyx castanocarpus
Dillenia retusa
Mangifera zeylanica

Control plot has
trees to 40 m or more.
3 strata - incomplete
canopy 30-40 m.
second layer about 20 m.
shrub layer 2-4 m.
this latter rather dense
but one can walk
freely between the
slender saplings.
no ground layer at all.

1956 Ceylon

Rainfall 75-100"

Large trees to 4-5 dm.
dbl. home buttressed.None of shrub layer
are saplings of canopy
trees - suppressed seedlingsThose of *Artocarpus*
tend to have small
entire leaves when
suppressed, incised
when young.*Artocarpus*, *Garcinia*
Cryptocarpus, *Nephelium*
Ocotea, *Mangifera*Epiphytes rare but
Asplenium nidus present.
Few ~~epiphytic~~ climbers
in interior of forest.*Xylocarpus parvifolius*
with long straight clear
trunks, bottle-brush crown
prominent buttresses.Soil brown - lateritic
gravel on slopes.Large trees perhaps
20 m apart where
canopy is good.Ground completely
protected by layer of
leaves, esp. *Artocarpus*.

March 16-26 - Kandy

Among the most
conspicuous features
of the landscape are
large numbers of crows.
These perform the function
of scavengers and seem
to take the place of the
vultures of tropical America.
They are very noisy and
very aggressive, and ubiquitous
around buildings and
habitations, seem very
well adapted to a com-
mensal existence with
man.Deraniyagala says
that in India the vultures
abound in the north and
are abruptly replaced
southward
by crows.There are two species,
a completely black one,
commonest at Kandy,
and a partially gray
one, noticed with the
black one at Colombo.

March 25 - Kamburumulla
Forest Reserve, half way
between Panalla and
Kuliyapitiya

34739

Ixora

occasional in secondary
thicket.

1

40 Phyllanthus

edge of secondary thicket

1

41

Boneria spemcoe assurgens R. & Hook
weed in clearing

March 25 - Badagamulla
Forest Reserve, 3 miles north
of Kurunegala

1

42

Combretum parvifolium

edge of forest along road.

1

43

Tincalypis

edge of thicket

1

44

Ixora

thicket

1

45

Ixora

secondary thicket

1

46

Ixora

secondary thicket

shrub 1.5 m. tall.

flowers white, odorless.

shrub 1.5 m. tall, ~~fr~~^{staminate}

flowers pendent, fruits
held erect from distichomely
arranged branches.

plant purplish green,
flowers white

liana hanging from trees.

sparsely branched shrub
1.5 m. tall, flowers white,
fruit blue.

shrub, flowers white.

shrub 1 m. tall, flowers
vermillion.

shrub, flowers vermillion.

March 26 Rail trip
from Kandy to Colombo.

The lowlands east of Colombo may be described as a catena with areas of very slightly elevated, usually rolling land, lateritic in nature, covered by coconuts, rubber, and general cultivation alternating with low flat marshy areas, largely devoted to rice cultivation, though left fallow for a short time. These fallow patches are covered by weeds of various sorts, the aspect depending on how long they have been uncultivated, how wet they are, how intensively they are grazed by water buffaloes, etc.

Areas with standing water are likely to be covered by *Salvinia*, *Nymphaea*, etc.

Heavily grazed areas ~~are~~ tend to be grassy. Other areas have a mixed wet flora.

March 26 - Colombo

32717

Pisonia grandis

planted in U.S. Embassy grounds

48

Pisonia grandis var. *alba*planted in U.S. Embassy grounds
very common in Colombo.rounded tree 10 m. tall,
all leaves green, fruiting
fairly freely.rounded tree 6 m. tall,
leaves on upper parts
whitish green. Leaves
said to be eaten. No
flowers or fruits seen.

Mar. 27 - rail trip from
Colombo to Galle

South of Colombo
the coast is lined with
a belt of coconut plantation.
The trees growing on beige
colored sand flats, with
either no ground vegetation
or a very thin grass. Where
there is a gap in the coconut
groves or a wide place in
the flat between the coconuts
and beach there is usually
a lumpy ground cover of
bluish green *Spinifex*
grasses, and often clumps
of *Pandanus*. This does
not have exactly the
same habit as *P. tectorius*
and the spines on the leaves
seem farther apart. There
are also low clumps of
Clerodendrum inerve (?)
and mats of *Sporobolus* sp. - etc.

Near *Pandanus* there
are clumps of *S. punctatus*
and flats of close cropped
green grass. *Santalum* and
Scaevola is a noticeable
component of the bery vegetation
also *Calotropis*. This is true
also inland in the coconut
plantation, where also *Hibiscus*
tiliaceus and *O. chrysia opposita*

folia (?) become important.
The greater the distance
inland the more species
of trees and shrubs are
found, especially around
the numerous dwellings.

Just north of Kalutara
is a lagoon or estuary
with marshes and
swamps along its margin
that show a considerable
diversity of vegetation ^{in places} ind. ^{in places} miles.

South of Kalutara the
top of the beach is lined
with large *Calophyllum*,
Terminalia, and other trees
and ~~at~~ here the under-
growth in the coconut
groves tends to be very
luxuriant. The grass
here, also, is much *greener*
and *darker*.

Along estuaries a
shrubby growth, in
which *Agallocha* ~~is~~ is
evident, with scattered
red leaves, *Pandanus*,
various mangrove species,
Clerodendrum, *Acrostichum*,
etc. In low lying
coconut land are channels
apparently for drainage,
also manuring, along which
Colocasia, *Acrostichum* and

are conspicuous.

Southward, toward Alutgama - Breadfruit & the arborescent vegetation in the coconut groves becomes much more luxuriant. Patches of estuarine swamp, and even a few rice patches alternate with much larger areas of coconuts. Houses are scattered through this area, as in most of the land from Colombo southward. Breadfruit trees are common, also some mangroves. *Alocasia* and *Xanthosoma* noticed here as well as *Colocasia*.

South of here the groves are more open and grassy, at least close to the beach. Obviously heavily grazed. Dwarfed *Pandanus* very common. Here the flat low coastal land is interrupted by low rounded rock masses here and there.

Southward, several hundred yards back of beach, are rather extensive rice fields. *Cinnamomum* sp.

becomes an important element, at least locally in the vegetation just back of the beach.

Just before Kozgoda a large estuary, lined with a narrow belt of scrubby swamp forest. South of this, breadfruit and other trees become abundant again in the coconut groves. *Carbera* conspicuous with its white flowers. Mangroves common. Some openings - either in garden cultivation or filled with bushes and low thickets, or marshy.

Standing water common in coconut groves. Large expanses of *Acrostichum* marsh and thin scrubby mangrove swamp.

Occasional knolls to 4-6 m. high of deeply weathered, apparently lateritic material.

Area around Ambalangoda some distance back from beach very luxuriant in appearance. Much taro in wet spots, also *Alocasia*.

South of here, just

back of beach, limestone
or ~~more~~ is being dug up and
buried in holes. Irregular
~~ponds~~ ponds result.

Then an extensive area
of scrubby swamps.
South of this, ⁱⁿ low
ground back of beach-
ridge, among houses
in coconut grove are
irregular pits, full
of water - possibly
settling pits. *Salvinia*
locally abundant in
there.

Synedrella is abundant
locally.

Southward the ground
between the coconut trees
seems to be systematically
excavated according to a
rectangular pattern of
either narrow or broad
ditches, these either filled
with water or decomposing
vegetable matter.

Near Hikkaduwa are
luxuriant taro patches
in low places in coconut
groves.

Southward more small
pits for lime.

Agave americana has
been seen locally at a

number of places all
the way down.

Goats and cattle are
common but not ~~so~~
abundant. The grass is
grazed to a thin sod
in many places.

Taro even more common
southward. ~~to~~

Before ~~the~~ *Vitex*
becomes abundant in
vegetation at top of
beach, apparently the
unifoliate form of
V. trifolia. *Pandanus*
and *Cheseria* conspicuous,
forming small thickets.
Calotropis also abundant.

Well back of beach
breadfruit, *Occhrosia*, and
taro abundant in coconut
grove. Some mangrove
along estuary north of
Gintota, but very ~~to~~ narrow.
Then some knolls of
laterite, locally rather
extensive, esp. around
Richmond Hill and southward.
Covered by coconuts, mango,
breadfruit, etc.

Living fences of *Hibiscus*
tiliaceus and *gliricidia*
sepium north of Galle.

March 28 - Kottawala

Arboretum of Ceylon Forest Service

A 15 acre patch of relative undisturbed rain forest. The larger trees are labelled and phenological records have been kept since 1977.

The area is irregularly hilly, with small ravines and rivulets.

The canopy seems quite irregular, not complete. A layer of small pole trees and shrubs 1-10 m. is fairly general. Called "shrub layer".

Top layer averages 125' ht. has fewer species than the lower layer. Has relatively few epiphytes but certain individual trees seem to have a fair abundance of them - *Drynaria*, orchids etc on trunks. Mosses and lichens on trunks fairly general. Epiphytes on branches are not at all conspicuous.

Canopy seems to be about 60% but even in

covered areas is thin.

This season has been unusually dry and flowering has been unusually heavy. Many species which have not flowered for years are now in flower.

On ridge tops the "shrub layer" is thinner, the individual trees smaller than on lower slopes.

Average base is 1-2 dm. diameter, though some individual much larger.

Lianas not conspicuous.

Randia gardneri is a medium sized tree, common on ridges.

Ground disturbed by wild pigs. Monkeys seen in trees.

Gleichenia is in opening from landslide or fire

Soil on ridge top -
 a layer about 3 dm. of
 yellow-brown mixture
 of clay and sand, becoming
 slightly more gritty and
 with small iron gravel
 downward. At 3-4 dm. is a
 compact but not consolidated
 reddish-yellow layer.
 This layer has harder
 and larger concretions,
 nut-size and stickier clay.
 Downward this becomes
 quite gravelly with
 the red-brown concretions.
 When cleared this type
 is said to form a hard
 crust very rapidly.
 Depth of soil 3 m. or more,
 changing gradually
 to bedrock.

Rooting of trees in this
 soil relatively shallow
 about 1 m. or so, from
 observations by foresters
 on windfalls, cuts, etc.
 No darkened surface
 layer at all. A layer
 of loose leaves and litter
 several cm. deep but
 transition very abrupt from
 intact leaves to none at all.
 The partially decomposed layer
 is less than 1 cm.

On ridge top, walking
 is scarcely impeded
 by the relatively thin
 layer of saplings.
 Small colony noted
 of a dwarf pandanus
 with stems not more
 than 1 m. high but leaves
 to 3 m. (or even 4) long.

In ravines the under
 layer is much thicker
 and of larger saplings.
 The scattered big trees are
 bigger. Ferns are
 common, with a slender
 tree fern with slightly
 prickly stems is conspicuous.
 Tectaria and several
 other genera noted.
 Including occasional
 some Marantaceae or Gramineae
 on flat places along stream.
 Climbers more common
 here, incl. Freziera.
 Corticolous mosses and
 lichens more developed.
 Ground layer on slopes
 present but very sparse
 and discontinuous.
 Sprouting of big trees
 irregular 2-20 m.
 Canopy almost complete.
 Second story sparse and irregular.

1954 Ceylon

soil on 25% slope
 was above stream in
 ravine - sometimes submerged
 during heavy rain.
 Surface litter of
 dried leaves 2-10 cm.
 but most leaves fairly
 intact - few in advanced
 stages. No hardened
 layer. about 10 cm. of
 silty sand yellowish
 gray-brown, friable even
 when moist.

Then 20 cm. or more of
 yellow brown very plastic
 clay with some coarse
 quartz grit and much
 biotite in irregularly
 scattered fairly large
 pieces.

Below about 3 dm the
 color becomes lighter and
 a mottling due to increased
 inclusion of biotite and
 (probably) pseudomorphs of to
 1-2 or more cm. of an incompletely
 weathered very light felspar
 giving a pale yellow clay.

The yellow-brown clay
 matrix is very plastic.

A very few soft dark red brown
 iron concretions, esp. in top
 layer, but not conspicuous.

The layer of dead
 leaves on the ground is
 infested with leeches
 in great numbers. These
 are reddish to gray or
 black, and when extended
 may be as much as two
 inches long. They crawl
 up on one's boots and
 will attach themselves
 even through a heavy
 woollen sock, starting
 to suck blood almost
 immediately. When
 pulled off, even before
 well attached, blood will
 run from the wound. If
 left till distended they
 detach themselves.

List of trees in Kottawa Arboretum
from Forest Dept. records - list submitted
by Rosapero.

Artocarpus nobilis Thw.
Lasianthera apicalis Thw. (Alac.)
Myristica dactyloides Gaertn.
Anisophyllum zeylanica (Rubi.)
Chaetocarpus castaneocarpus Thw. (Euph.)
Dipterocarpus hispidus Thw.
Mangifera zeylanica Hook.
Campnosperma zeylanica Thw.
Doona ovalifolia Thw. (Dipt.)
Dipterocarpus zeylanicus Thw.
Kurrimia zeylanica Griseb. (Calac.)
Dillenia retusa Thunb.
~~Myrsine~~ *Horsfieldia irya*
Chrysophyllum roxburghii G. Don.
Wormia triquetra Roth.
Palaequium rubiginosum Engl.
Hydnocarpus octandra Thw.
Palaequium petiolare Engl.
Mesua thwaitesii Pl. + Tr. (Gutt.)
Symplocos cuneata Thw.
Calophyllum spectabile Willd.
Vitex pinnata W. (V. altissima W. F.)
Cephaelis latifolia Thw. (Euph.)
Mastixia thwaitesii (Corn.)
Garcinia ternstroemia Thw.
and var. *acuminata*
Isomandra lanceolata Thw. (Hep.)
Timonius jambosella Thw.
Memecylon rostratum (Mel.)
"Keriberaliza" (Dipt.) unident.
Palaequium parvifolium

Symplocos coronata Thw.
Eugenia grandis
Kolomia zeylanica Thw. (Calac.)
Aceronychia laurifolia (Rubi.)
Gyneros walteri Gaertn. (Thym.)
Clasocarpus subvillosus Arn.
Byrsophyllum ellipticum (Rubi.)
Eugenia sylvestris Moon.
Cryptocarya wightiana Thw.
Canarium zeylanicum Bl.
Myristicirya Gaertn. (= *Horsfieldia i.*?)
Calophyllum bracteatum Thw.
Polyalthia acuminata Thw.
Leuocarpus subpeltata Thw.
Garcinia echinocarpa Thw.
Leuocarpus parvifolia Thw.
Sunaptea scabriscula Trim. (Dipt.)
Carallia calycina Benth.
Actinodaphne stenophylla Thw.
Ritsea gardneri Thw.
Dipterocarpus glandulosus Thw.
Carallia integrifolia DC. (Rubi.)
Mascaranga digyna Muell.
"Ludu wana? dala" unident. Rub.
"Kaha badulla" unident.
Randia gardneri
Garcinia cambogia Desr.
Agrostistachys hookeri Benth. (Euph.)
Bridelia retusa L.f. (Euph.)
Canthium didymum Gaertn. (C. dicoccum Merr.)
Xylocarpus championii Hook. f. & G. (Annon.)

Phenological observations
being kept up by local officers.

~~Kott~~ Mard 28 - Kottawa
Arboretum, near Galle

- 74749 *Oxbochia*
edge of rain forest
- 50 *Melastoma*
cleared roadside, edge of rain forest
- 51 *Artocarpus nobilis* Thw.
common in rain-forest
- 52 *Dipterocarpus zeylanicus* Thw.
common in rain-forest
- 53 *Dipterocarpus hispidus* Thw.
~~very~~ common in rainforest
- 54 *Warinia triquetra* Rottb.
occasional in rain-forest
- 55 *Artisia*?
rare on ravine side in
rain forest
- 56 *Ternstroemia*?
rare in rainforest
- 57 *Planchena linearis* (Burm.f.) C. B. Cl.
common in openings in
rain forest on steep slopes
- 58 *rub*
rare in undergrowth in
rain forest
- 59 *Hedyotis inaequalis* Thw.
occasional in undergrowth
in rain forest
- 60 *rub*
rare in undergrowth in rain forest
- 61 *Hedyotis frutescens* L.
common in weedy land on slopes.

- shrub 2 m. tall, sparsely
branched, flowers rose-pink
- erect shrub 2 m. tall;
flowers rose pink.
- large tree, ^{dry} leaves picked
up from ground
- enormous tree, dry leaves
picked up from ground
- enormous tree, dry
leaves picked up from ground
- leaf from ground and
one secured by native
from shoot of large tree.
leaves dark green above
purplish beneath, thick;
inflorescence and flowers
bright pink.
- small much-branched
tree, buds white.
- forming dense tangles
- shrub 1.5 m. tall; fruit
black, fleshy.
- "wakkopi"
- shrub 1 m. tall, leaves
pale beneath, flowers
white. "kaluvaramiya"
- shrub 2 m. tall; inflorescence
pale green, in bud only.
- erect shrub 2 m. tall;
flowers white.

March 28 - Coast between
Galle and Hikkaduwa -

The coastal plain is
only a couple of feet above
sea level. There has
been extensive work done
to lessen erosion by the
sea, in the form of lining
the beach with large boulders
of metamorphic rock.

- 3/6.762 *Cerbera pagiantha* ^(Det. D. Nicolson) *dichotoma* (Pav.) Markgraf.
on sandy area back of
beach

- 3 63 *Vitex trifolia*
common on sandy area
behind the beach

- 4 64 *Scaevola sericea*
common on sea-wall off
boulders.

shrub 2.5 m. tall. Erect, flowers
white with yellow
eye, buds yellow, fruit
orange and fleshy
with two lateral ~~lobes~~ ^{lobes}
angled when ripe, pendent.
spreading shrub,
horizontal stems
with bushy secondary
branches; leaves
small ever 2 m. tall;
flowers lavender, fruit
white (note ^{near} lack of silky
axillary hairs).

May 27 - Hikkaduwa

11 mi n. of Galle

sand flat with *Sporobolus*
pes-caprae fringe at
 top of beach, with *Emilia*
 in the mat of *Sporobolus*.

Back from the beach
 are low tangles of *Clerodendrum*
inermis. Here it has very
 fleshy leaves. Good
 flowering specimens were
 not seen.

36765 *Pandanus pasturus* St John Holotype
 very common along top
 of beach.

~~in Ceylon~~

1 66 *Clerodendrum inermis* (L.) Gaertn.
 locally common back of
 beach.

2 67 *Sporobolus pes-caprae* (L.)
 common at top of beach of
 quartz sand.

2 68 *Emilia sonchifolia*
 common in mat of *Sporobolus*
pes-caprae at top of beach.

Pandanus along shore
 is a small, densely
 branched slender species
 with spines larger and
 more remote than in *P. tectorius*.
 The stems are clothed
 with dried remains of
 leaf bases. The color of
 the leaves is bluish green.
 The heads are small, more
 or less globose, with the
 phalange more or less
 truncate apically.

slender, stemmed
 densely leafy tree 5 m. tall,
 fruit head round, small,
 becoming orange,
 not eaten. Branches
 clothed in old leaf bases,
 forming low tangles;
 leaves fleshy.

forming thin mats, not
 over 3-10 cm. deep; leaves
 somewhat leathery, with
 an angle between blade
 and petiole; flowers deep
 rose-purple, closed at
 4:30 p.m. when collected.

depressed fleshy glaucous
 plants; flowers pinkish
 lavender, slightly
 exceeding involucre. (seed sample for
 J.T. Baldwin) ^{Voucher for} *P. chinensis*

March 30 - Nuwara Eliya.

The town is in a rolling flattish valley, surrounded by mountains. The forest has been cleared and replaced by grass and groves of exotic trees - Cupressus, Eucalyptus, Acacia, etc., even Cryptomeria. Some of the Cupressus are immense. The cones are too small for C. macrocarpa. The habit is spreading and when old the trunks are fluted irregularly.

Waste spots are irregularly covered by Ulex, with scattered Rhododendrons with heavy woody trunks, gnarled and scarring by out of proportion to the size - about 5 m. tall. The capsules are 10-loculed, dehiscing loculicidally 5 sutures first, then the valves splitting, making 10.

The Acacias are probably A. dealbata and A. melanoxylon. The former is flowering some.

It has been abnormally dry here since October. The last rain was about two weeks ago, when a little bit fell in the evening. Things are in poor condition and water is scarce.

The slopes west of the town are partly covered by tea plantations, part by a mixed scrub. Whether the scrub is a result of fire or of cutting of firewood is not clear but probably the latter. Acacia seems to be cut out of it as soon as it reaches any size.

The scrub averages about 2 m. high, somewhat less at the bottom and more toward the top of the hill. Apart from a few plants are represented - Berberis, Castanopsis (red-fld), and Pteridium, Solanum are found especially lower down.

Rubus, Tabernaemontana (?), several shrubby Compositae, ~~perhaps not a Compositae~~ and a sterile hispid shrub with opposite leaves and stilt roots seem to be rather general. Upward Erica, Rhododendron, Rhodomyrtus and a number of other shrubs such as several Melastomaceae and a Chusquea-like climbing bamboo become more prominent upward, also a Gentianaceae with winged calyx. Scattered on the upper slopes are emergent small trees.

3-4 m. tall, gnarled and twisted, mostly *Rhododendron*, not in flower now, but mostly with almost mature fruit.

On the ridge top the scrub gets taller, 3 m. or more tall. Here it is in some places almost entirely made up of the hispid leaved shrub mentioned on the slopes. Here this forms dense trunks of long straight stems an inch or less thick.

Other shrubs locally mixed with it. It has the behavior of a plant that follows fire in its pure even stands but no evidence of fire.

With things as dry as at present fire would be a definite possibility, but this is unusual. There are not many ferns, though, and few epiphytes or creepers.

This scrub as well as that on the slopes is so dense as to be impractical to walk through without a machete.

Scattered in the ridge scrub are small patches of small trees with the habit of *Metrosideros* - one species actually looks like *Metrosideros* but is sterile at this season. A number

of genera are represented. These trees are from 4 to 8 m. tall. On parts of the ridge these trees are not in patches but scattered as emergents in the scrub. Here there is a bit of the climbing bamboo, small patches generally scattered in the ridge top scrub.

Wild figs have been digging in various places. The soil is rather yellow-brown clay.

Where the ridge has a broad flat top there is a tea plantation with no shade. On the south part of the ridge all except the cliffs are covered by tea plantation, partly unshaded, partly with sparsely scattered *Grevillea robusta* trees.

The soil in the tea plantation is kept very loose by hoeing. It is almost yellow ochre colored on the top and steep slopes, becoming slightly more reddish on the gentler slopes below. Very fine and clay like both places.

Pteridium aquilinum seems to be a bad weed in the plantation, at least quantities of rhizomes have been dug out.

Mar. 30 - ridge west of
Nuwara Eliya, center of island,
scrub and patches of scrub
forest on ridge top.

36769 *Psychotria*? clay bottom of
very local or desiccated small
pond

3 70 *Psychotria*
common in patches of scrub forest

1 71 *Metrosideros*?
common in patches of scrub forest

1 72
dominant in tall scrub

2 73 *Pithecolobium*
occasional in patches of scrub forest

1 74 *Hedyotis corymbosa* (Lam.) Alston
occasional in edge of scrub.

Mar. 30 Upper Nuwara Oya
river just below Nuwara Eliya,
center of island.

montane rain forest,
rather degraded;

2 75
2 76
2 77
2 78

2 79
2 80
2 81
2 82
2 83

2700 m.

Scirpus fluitans L. det. J. Koyama, 1975

70 gnarled tree 2 m. tall; stipules
those of *Stranvaesia*; flowers
greenish, tube very short.

71 tree with rounded bushy
tips to limbs; sterile.

72 erect shrub with stiff
roots; leaves tending to
be purplish when young,
without pronounced odor; sterile.
tree 6 m. tall; fruit immature.

73 erect shrub 1.5 m. tall; leaves
deeply sulcate.

on great boulders of
metamorphic rock along
stream.

epiphytic on trees in
rain forest, rather degraded.

APP.

- 36784 *Sphenomeria tenuifolia*?
on vertical roadcuts in
hard clay
- 1 35 *Lycopodium*
on overhanging rock
just above stream
- 1 36 *Psychotria*
rare in edge of second growth
- 2 37 *Hedyotis* *Trimenii* Deb & Datta
in roadside brush
- 1 38
weedy roadside

The Nannaya ravine
and the mountain slopes
above it are covered by
a mixed montane rain-
forest with many
species represented (mostly
unidentified even to genus).
Weinmannia and *Cyathus*
(at least 2 species) were noted.

The stature is low, 5 m. ±,
on exposed ridges, 10 m. ± on
open slopes, and up to 20 m. in
ravines.

Mosses and vascular
epiphytes, as well as parasitic
Loranthaceae, are common on
trunks and main branches
of many of the trees, but
not so on smaller branches
or leaves except in ravine

tufts; fronds ~~smaller~~
drooping at tips

pendent.

shrub; m. tall; flowers white

erect shrub 1.5 m. tall,
leaves smooth.

small shrub 0.5 m. tall;
flowers white.

bottoms. They are not
nearly abundant enough
to make this a cloud forest
or elfin ~~forest~~ wood.

Ferns are common on
ground, becoming much
more so toward the ~~top~~
ravine bottom. We have
examined there is a tangle
of weedy shrubs, probably
as undergrowth, probably
largely resulting from
disturbance: some climbing
bamboos and a very large
Amomum (?) with a bright
red inflorescence.

It is so dry that the mosses
and most of the ferns are
curled up.

There are few real climbers.

except in the ravines, but an abundance of scramblers such as *Clacagnum*, and especially the hirsute-leaved shrub mentioned above (34712). Of this latter there may possibly be 2 species, an erect one and a scrambler.

Roadsides and other recently bare places are covered by a blue-flowered iridaceous plant and a small *Eupatorium*, several grasses, incl. *Chrysopogon*, ~~and~~ *Eriogon parviflorum*, *Pteridium* etc. The steep cuts are being colonized by several grasses, *Sphenomeris*, and by *Lycopodium complanatum*. Here definitely seem to be sproutings of this plant unless there are germinae. There has never been any volcanism as far as known.

On talus below roads, brushy roadside, etc. in the area of tea plantations have a low bush of *Rubus*, *Cestrum*, *Ulex*, *Lolium*, ~~and~~ *Hypericum* (a tall shrub with large flowers - when sterile it looks like *Veronica* (Hebe)), and a shrubby *Lobelia*.

March 31 - east side of Nuwara Eliya valley.

On sloping ridges ~~extending~~ extending from the foot of the mountain, where they are neither cultivated, in orchards, or eroded bare, there is a scrub more or less similar to that on the west side.

It is dense and tangled, about 1 m. high at lower edge, increasing to 2-3 m. upwards, and in places even perhaps 4 m. The presence of several prickly scramblers (*Toddalia*, *Rubus* etc.) ~~as~~ makes pushing through it most difficult and unpleasant. It is composed of climbing bamboos, *Melastoma*, *Rhodomyrtus*, *Berberis*, *Hedyotis* (3 spp.), *Rubus*, *Lobelia*, *Toddalia aculeata*, *Pittosporum*, several woody *Compositae*, *Gardenia* (? sterile), *Pteridium*, *Morinda*, *Myrsine*?, *Ecloga*, *Tabernaemontana*?, the same hirsute-leaved shrub seen yesterday and several other unfamiliar shrubs.

~~the~~ On the steeper slope of the mountain, up from the tops of the ridges described is a woodland which seems to be a much degraded montane rainforest. It has scattered trees of ~~a number~~ species 10-12 m. high, mainly with a metrosideroid growth habit, spaced from 10 to 50 m. apart, closer and closer together upward to about 150 m. above the valley floor where it closes into a montane rainforest quite degraded and with dense tangled undergrowth 3-4 m. high.

In the woodland part the ground is covered by

March 31 - slopes east of
Nuvana Eliza
in tangled scrub.

36789

Hedyotis?

very common, even in almost
bare places

90

Toddalia aculeata

common

91

Morinda

occasional

a dense low scrub 1-2 m. tall with some of the plants from the scrub below, some others, dominantly a very aromatic opposite leaved hirsute plant now sterile, with the slender *Hedyotis* (?) common, as well as the sterile hirsute plant seen yesterday, and young trees of a brownish tree in the Lauraceae (*Nelipia*?).

Small paths wind through this scrub and lose themselves. In all probability the present vegetation is the result of severe cutting for firewood in a montane rainforest accompanied by persistent grazing, the cattle not taking the aromatic plant.

1960 m.

erect slender shrub 1 m. tall
(others seen to 2 m. in taller vegetation);
flowers white.

erect to scrambling or
scandent shrub, aromatic when broken.
shrubs 1 m. tall; fruit
immature.

March 31 - road from
Nuwana Eliya to Hakgala
Botanical Garden, down
Hakgala Ganga (stream).

Upper part of stream
valley flat, mostly in
truck gardens. In places
the stream is dammed
up for fishing, planted
with trout by Ceylon Fishing Club.

Just below Nuwana Eliya
Eucalyptus and even
some *Casuarina equisetifolia* (?)
are planted, along with
Cupressus. Tea plantations
in this section are irregularly
cut into patches by hedges -
for protection against wind,
etc. Guide says this is only
done by one company. No
shade trees in these plantations.
Many of the plantations
have been severely hit by
frost (1 1/2 months ago) and some are pruned back
almost to the ground.

Down a short distance
the tea plantations are replaced
by bushy forest on the
slope and some grass on
lower slopes, or all forest.

At about mile post 52,

a little over half-way to
Hakgala, the pattern
of grass land on lower
slopes, montane rain-forest
on upper slopes and in
ravines is rather definite.
The forest is mixed and
of low stature. The grass
is mainly tufted (*Cymbopogon*?)
and has scattered
gnarled *Rhododendron*
trees in places.

Near mile post 54 the
grass and forest was
examined. The slope
is about 30°. The lower
100-150 m. is grassland,
badly overgrazed, with
a blue-flowered iridaceous
plant locally dominant,
bunchy *Cymbopogon*
locally prominent, and
a close sod of several
creeping grasses filling
the interstices. The forest
has probably been gradually
pushed back, as a narrow
strip along its margin has
recently been felled. The
soil changes gradually
from black just above
the stream ravine to brown
at the edge of the forest.
A typical profile was

all signs of *Rhododendron*
fairly general in tall
grassland

exposed where the underlying schist bedrock was being quarried for road material. This was just above the ^{former} edge of the ravine. Profile as follows:

- 0-10" black sandy loam, gradually changing to
- 10-20" ^{yellowish} brown clay with some rock fragments, abruptly changing to
- 20"-4-6' mottled irregularly reddish clay with rock fragments, directly on hard bedrock. The rock weathers only an inch or two, then hard and dark gray.

The surface layer varies from gray to black and also in thickness. It would be of interest to know if this black layer has been formed as recently as its occurrence near a receding forest margin suggests.

The ravine at bottom, where not excavated, is filled with a ragged wood, partly native trees, partly *Acacia dealbata*. A little *Gleichenia linearis* here, a few tree ferns.

The forest above the grassland is of low stature, 5-8 m., the trees gnarled, with *Metrosideros* habit, small leaved, dark in color, green to reddish green.

Principal trees are *Psychotria*, *Metrosideros* (?), *Eurya*, and *Neolitsea* (?). Vascular epiphytes common on trunks and larger branches, mosses and lichens fairly abundant and even to smaller twigs in crowns, not enough, however, to make it a ^{typical} cloud forest or moss forest.

Climbers and scramblers are common, though mostly in more disturbed parts, mostly prickly, such as *Rubus* (1 spp.), *Toddalia*, etc. Some climbing bamboo of a startlingly chuequeoid appearance.

In less disturbed spots undergrowth is mostly of tree seedlings, ^{in places} thick but easily enough penetrated even without a machete. On the ground are ferns and *Selaginella*.

It is mostly much more disturbed, probably by cutting for firewood and

certainly by grazing.

Here is a much thicker undergrowth, with larger saplings of the dominant trees tangled with climbing bamboo, ~~Hedyotis~~ (~~2 spp.~~), ~~Rubus~~ (~~2 spp.~~), ~~Toddalia~~, etc.

The openings are choked with a tangle of *Hedyotis* (2 spp.), climbing bamboo and *Rubus* (2 spp.) as well as some *Psychotria* saplings.

Penetration here is very uncomfortable without much cutting.

In the forest was seen an *Ardisia* with ~~a~~ inflorescence very like the *zebrina* form of *A. atrovirens*, but with a digitate leaf with 3 leaflets.

March 31 - Hakgala Ganga, about 1 mile above Hakgala.

36792 *Hedyotis Trimenii* D. & D. & T.

in tangled opening in degraded montane rain-forest.

The bamboo has hollow stems and climbs to 3-4 m. in dense vegetation. Looks for all the world like *Chusquea*.

On some grassy slopes not far from here are sparse plantings of *Eucalyptus*.

Hakgala Gardens are beautiful, have a wealth of species of plants, but show definite signs of neglect. 5581 ft. alt.

53 acres.

Mean annual rainfall 94.85"

Mean temperature 60.9° F

Lowest " 38.8° F

Highest " 82.2° F

1800 m.

shrub 1.5 m. tall, erect.

March 31 - trip ^{from Nuwara Eliya} to Moon
Plains, ^{Duluwala Gorge} and Hawa Eliya.

Grassland around Nuwara Eliya
also has scattered
small trees of *Rhododendron*,
in places almost forming a
woodland. The *Rhododendron*
extend along the road
everywhere where the
road is not through forest.

Eucalyptus and *Cupressus*
are abundantly planted.

Tea plantations, mostly
with hedger, common along
upper part of road. Then
hills, some grassy, others
scrub-covered, others with
rather poor montane rain-
forest, others covered by
planted *Eucalyptus* and
Cupressus.

The Moon Plains are a
rolling grassland with
scattered *Rhododendron*,
heavily grazed.

Rhododendron woodland
near here immediately
along road, 3-4 m. tall, only
a strip along road. The
origin of this is obscure -
either the trees were left when
all else was cleared, or they have
grown up relatively rapidly

afterward, which seems
unlikely. But in the forest
Rhododendron is not obvious,
though there was no time
for a close examination.

The gorge of the Duluwala
stream has part of its
wall ~~is~~ covered with dense
montane rain-forest
apparently in fair condition.
The slopes are very steep.
However, part of them are
in grassland.

Toward Hawa Eliya
the forest becomes very
degraded, with scrubby
Rhododendron near
road, patches of tangled
scrub with much
Hypericum mysorens, some
tea plantations. Much
Acacia dealbata and
Cupressus planted near
and around Hawa Eliya,
~~where~~ even a few pines
of at least 2 species. Here
also some marshes in
the flat valley bottom
and some gardens.

April 1 - trip by rail from
Nuwara Eliya to Colombo.

The upper part of the
canyon of the Nannu Oya river
is almost entirely densely
wooded. The lower part
to Nannu Oya (5137 ft.) is
all covered by tea plantations.
This continues downward
except on the steepest slopes.
No consistent pattern in
planting but more seem to
have the rows running straight
up and down the slopes than
not. Scattered shade
trees, mostly *Grevillea* and
Erythrina. In the vicinity
of Watagoda most of the
trees are cropped back
rather drastically - possibly
as a measure against the leaf
blister disease. The general
spacing of the trees is
so open that the shade
is moderate, indeed.
The distance varies but
is at average 20-25 m.
Albizia is used in
some plantations, especially
lower down. Below Watagoda
and especially near
Talakawelle, small, closely
pruned trees of *Erythrina*

are planted a few yards
apart between the larger
shade trees. This seems
rather regular and
can scarcely be for shade
purposes, maybe for
poor manure. Each tree
has only two or three or
at most a few leafy
branches left on it, though
~~at~~ on some plantations
below Talakawelle they
have been allowed to grow
more and have a turkey
cluster shape. Here also
Glinicidia ~~seems~~ is
almost as common as
Erythrina in this second
layer. This layer is
pruned to 2-3 m.

Near Hatten are some
Eucalyptus plantings.
Shade trees, mostly *Grevillea*,
closer together, perhaps 10 m
apart, from here down. The
small intermediate
trees more uncommon here.
Some plantations well
below Hatten with no
shade at all.

Fourcraea

Fourcraea locally common
from here down
Grassland, with *Imperata*
and some *Themeda* - more and

more common ~~the~~ down west
some patches of forest
and Eucalyptus plantations.
Shifting cultivation rather
common. Patches of thicket
and of a large *Rottboellia*
(similar to that found on Guam
in 1954). Ravines filled
with thickets.

Galboda
Station

Near foot of steeper
part of mountains the
greater part of the land
is in "chena" or shifting
cultivation. Coconuts appear. ~~also~~
Navalapitaya first fairly
extensive rice paddies,
also rubber plantations.
Much grassland. Few
tea plantations here.

General pattern is a
majority of the hill
land open, small patches
of wood. Of valley bottoms
and lower hills practically
all are in rubber, coconuts
or tea. Some areas terraced
for rice. Breadfruit and
mango trees common, also
bananas, *Areca*, *Caryota*, etc.
As valleys get wider the
rice area increases. All
is stubble. Shrubby *Lobelia*
occasional in waste spots.
Soil erosion very obvious.

1897' alt.

Tea plantations seen in
very poor condition.
Especially much erosion
around Pallegama. Shade
trees (*Grevillea*) in tea
plantations seen in
rather poor shape.

Around Ulapane the
tea plantations are
apparently abandoned.
Bare red soil with
sparsely bushes.
scattered shade trees.
general tone of land reddish
except valley bottoms,
which are in rice and
miscellaneous tree cultiva-
tion. Rice conspicuously
terraced, terraces mud-walled
and well constructed.

Below here much of the tea
is in better condition.
More heavily shaded than
higher up. Shade trees
5-10 m apart, mostly
Grevillea, with second
layer between of *Gliricidia*
and *Euphorbia*. *Areca*
more and more abundant.
Rubber plantations more
and more common. Some
cacao. Steeper hills
mostly in grass with
patches of woods. A few

tea plantations on steep slopes, rows running straight up and down.

Near Gampola the valleys become broad and flat-bottomed with rice fields. Hills steep. At Gampola station the flood level Aug. 15, 1947 is marked, about 5 m. above ground.

Villages and dwellings almost ~~completely~~ completely concealed by mixed plantings of Coconut, jak, leiba, Mango, Areca, breadfruit, and other trees, with an understory of bananas, guavas, etc. Some bamboo. This is upper valley of the Mahaweli River.

One rubber plantation seen with understory of tea.

Hills here very low, but still abruptly rising from flat paddy land.

Clumps of sugar cane seen, but no sugar plantations seen anywhere in island.

Many carabos working in rice fields.

Below Peradeniya the slopes are largely covered by mixed tree cultivation, ~~mostly~~

with coconut, Rubber, jak, breadfruit, bananas, Cargota, Areca, Kapok, mango, bamboo, and with cacao under some of the rubber trees. Very little tea below Peradeniya. Some slopes terraced. Valley bottoms where flat, in rice.

First *Salvinia* seen at Mirigama.

April 4 - Kanheri ~~Coast~~ National Park, ^{North E. Bombay} (50-100')
thorn woodland on rolling
stony ground

36793 *Callipteris floribunda*
very common

94 *Canthium*
common

95 *Adina cordifolia*
common

2 96 *Holoptelea*
occasional

97 *Coldenia procumbens*
local in open ^{dry} water-course

98 *Mollugo*
local in open ^{dry} water-course

99 (*Atylosia*) *Cantharospermum acrolepis*
rare

36800 *Carissa carandae*
occasional

01 *Morinda tomentosa*
~~occasional~~ occasional

02 *Derris scandens*
occasional

03 ~~Canthium~~ *Dendrocalamus strictus* ^{Bambusa nundanae Retz}
dominant, especially in
wide valley bottoms

semi-scandent shrub

small shrub

small tree, deciduous

shrub or small tree,
lactiferous; flowers white,
fragrant.

very prostrate blue

prostrate

flowers yellowish.

~~shrub~~ shrub, ~~fl~~ apparently
not deciduous; flowers
white.

shrub or small tree,
flowers white.

woody climber or tree,
sterile.

Culms clumped, up to 30 cm.
apart, green, dull, anthers,
to 10-15 (or 20?) m. tall, branches
distichous and emerging
conspicuously at right angles;
lower branches solid, elongate,
to 5 m. long, spiny, forming
formidable tangles, leaves deciduous.

ditto
the above

April 4 - Kenhri Caves,
Kenhri National Park, ^{about 1000'}
Dry deciduous forest,
rather open.

36904

Capparis

05

Vangueria spinosa?
occasional

06

Grewia tiliaefolia
occasional

07

~~Disopyros ebenum~~ Caesaria
~~Calanthe mentosus~~? tomentosa

08

Aphelandthus
rare on ledges

09

Capparis sepiaria
rare

10

Vitex negundo
occasional

11

Solanum
occasional near house

12

Holoptelea
occasional

13

14

Randia dumetorum

15

Crataeva religiosa
rare

16

Gardenia
occasional

April 4 - Juhu Beach, Bombay

17

Pandanus
top of beach, quartz sand

shrub
small tree, flowers
green, petals reflexed,
stigma fleshy, more
less horizontal.
small tree, flowers
yellow.

erect, stiff herb.

semi-scandent shrub
clambering or small tree.
slender small tree

shrub, fruit orange
tree.

18

prostrate
small shrub

shrub, deciduous,
flowers yellowish.
small tree, fruits yellow.

19

small tree

April 5 - Bombay

Claoxylum inerme is used as an ornamental, being trimmed into hedges. Its leaves are uniformly obtuse or rounded at apex. The flowers seem a bit smaller and more slender than those of the Pacific form.

36318 *Paraca indica*
planted

Crows are common here, but not as common as in Ceylon. They are, however, accompanied here by vultures and "hawks" (probably another vulture with a long rather square-cut ^{black} tail, black in color). These may be seen commonly soaring around the city,

There are rather extensive mud flats occupied largely by mangroves of one species only, *Avicennia alba* (?), which is uniformly very small, less than 1 m. tall, but growing quite densely. They are said to be so small because of grazing and cutting for firewood.

Some areas of the mud flats are quite bare, largely covered by a whitish salt (?) crust, while smaller areas, intermixed with bare places, are covered by a grass (*Distichlis*?) and other herbs, only about 1-2 dm. tall.

tree flowers orange.

and are especially abundant around the "Tower of Silence" of the Parsees, where they devour the flesh of the Parsees dead, placed there for this type of disposal.

April 4. Juhu Beach,
near Bombay.

This beach consists of a broad bank or very low, almost ~~flat~~ flat ridge of fine sand and silt, called and firm underfoot. This ridge is almost entirely covered by coconut plantation except for streets and houses. From this is a body of ~~water~~ shallow water. The outer shore is a very broad flat beach, cut into the ridge to form an abrupt escarpment about 2 m. high. The beach is of fine quartz sand with some admixture of larger particles of shell.

Sporocarpium pes-caprae is common here and appears to be the same as that seen at Hikkaduwa, Ceylon, except for a greater tendency to form ascending branches, these 20-30 cm. tall, very loose.

What is called *Pandanus odoratissimus* occurs ^{scattered} along the escarpment at top of the beach. It is a small tree a bit more slender than *Pandanus tectorius*; leaves with

spines 1-2 cm. apart, their bases broad, the spine divergent at about 30° from margin of leaves.

The fruiting head is small, only about 10 cm. diam., spherical, the keys quite flat on top, and with more stigmas than common in *P. tectorius*. This tree looks very much like the one collected in Ceylon except that there is no tendency for the leaf bases to persist on the branches and the keys have more stigmas, also the fruiting head is smaller.

April 4 - Kanheri National Park, north of Bombay.

The lower part of this area is flat and covered by mangroves with some parts rather poorly landscaped and planted to ornamentals. It is said (by Prof. F. R. Barucha) that a horticulturist was appointed director of the park and that he had the idea of landscaping it and making it a place for people to have picnics on Sunday afternoons.

He got into financial troubles and was let out. Now the government "milk colony", a government run dairy, is using the park as a pasture.

The lower part is really sorry looking. *Borassus* palms are very common scattered over the flat low country. Many of them are covered in their lower part by strangling figs, *Ficus benghalensis* and *Ficus glabra* (?). These form a rigid cage of aerial roots around the

trunk but do not seem, in most cases, to hurt the palm any. The ones seen did not generally extend more than half way up the trunks.

Inland the dwellings and orchards disappear and the ground begins to rise gradually, to be rolling and slightly cut by dry stony watercourses. The ground is very stony, with boulders scattered over it. *Argemone mexicana* grows scattered in the watercourses. The rest of the country is covered by a low scrubby thorn woodland, open enough so that walking on an irregular course is not impeded. The ground is baked and dry, the grass and many of the herbs completely ~~too~~ dry and in most places burned off. The fires are set by the people to improve grazing. Several herbs, especially *Blumea eriantha*, *Coldenia procumbens* and a tomentose *Mollugo* are in thriving condition. The two latter are

closely prostrate and bluish-gray in color.

The woody vegetation is a ^{deciduous} mixture of clumps of bamboo, small trees, shrubs, and woody vines. Most of the shrubs, the bamboo, and some of the trees and vines are spiny or prickly. The bamboo, which is the tallest plant, forms clumps of ascending ^{ascending} culms, 10-15 (20) m. long, green, with internodes 20-25 cm. long, 7-9 cm. thick. The branches are distichously arranged and emerge at right-angles from the stem (divaricate). Culm sheaths and ^{blades} ~~leaves~~ are deciduous, have been shed at this season. New leaves are just appearing. The lower branches are elongate, to as much as 5 m., viciously spiny, and form terrific tangles about the bases of the clumps. The culms are from very close to as much as 30 cm. apart in the clumps.

Trees here are mainly *Adina cordifolia*, *Borassus flabellifer*, *Diospyros ebenum*, *Cassia fistula* (completely deciduous), *Grewia tiliaefolia*, *Pongamia glabra*, *Zizyphus jujuba*, *Morinda tomentosa* etc. Shrubs are *Callicopteris floribunda*, *Holarrhena*, *Lantana camara*, *Randia dumetorum*, *Canthium* sp., *Flacourtia*, *Acacia catechu* (with small hooked stipular spines and very finely compound leaves), *Jasminum malabaricum*, *Carissa carandas*, *Pflueggia leucopyxis*, *Zizyphus rugosa* etc.

Tinospora cordifolia (?) a woody, now leafless vine, sends down slender, cord-like aerial roots. Several of the shrubs, including the rather abundant *Callicopteris*, tend to be scandent.

As the bases of the hills are approached, the bamboo becomes definitely dominant, the vegetation more closed,

and Bombax, with conspicuously ~~thorny~~ prickly trunks, become conspicuous and common.

As soon as the actual hill slopes are reached, the bamboo almost drops out, except in the flat valley bottoms, where it remains quite dominant.

On the slopes the vegetation changes to a dry deciduous forest ^{woodland}, not especially thorny. *Borassus* disappears completely.

In the vicinity of Randeri Caves, at about 150-200 m. the forest contains *Pongamia*, *Diospyros*, *Vangueria* species, *Wrightia floribunda*, *Sterculia urens*, *Sterculia colorata*, *Erythrina*, *Morinda tomentosa*, *Ocimum* ^{water} ~~wood~~, *Holoptelea*, *Bombax malabaricum*, *Gardenia* sp., *Plumeria rubra*, etc. as trees. Shrubs are *Euphorbia nerifolia* L., *Capparis sepiaria*, *Vitex negundo*, etc. At this altitude only *Vangueria*, *Vitex*, *Morinda*, and some of the *Pongamia* have leaves. Above about 200 m.

more of the trees have leafed out, showing how new the leaves are by their bright green. ~~At the altitude of the cave only Morinda.~~

Above the caves *Plumeria rubra* forms trees ¹⁰ m tall, leafless but in bloom. *Sterculia colorata*, *Wrightia*, *Morinda*, *Euphorbia*, and *Ocimum* are in young fruit or flower.

These slopes are a massive occurrence of a volcanic breccia or pyroclastic material. ~~Over~~ considerable areas in the vicinity of the caves degradation has been carried to its ultimate stage. There are extensive areas of completely bare rock. Clumps or bushes of *Euphorbia nerifolia*, looking like cholla cactus, are scattered here and there. Patches of grass, *Schizanthus ciliare*, *Trifolium*, and a few other herbs are completely dry. There are desiccated pools which during the season just after the monsoon contain a

special flora. Not a trace of a plant is to be seen there now. Grasses, especially *Tridax*, are common in the rock crevices, but now completely dry.

At this season most of the plants are in a leafless condition. However, the total rainfall is said to be about 80" annually.

The undergrowth in this dry deciduous forest is almost all of a species of *Strobilanthus* with a virgate habit of growth and persistent largely dry leaves. Burning is very widespread.

In the soft pyroclastic rock are numerous artificial caves, excavated by Buddhist monks, 2500 years ago. Some of them are very impressive. Relief carving on the walls, especially around the entrances, is quite beautiful. Bats are numerous and their odor and squeaking are very obvious.

The age of these caves gives some measure of the extent of human influence on this vegetation.

April 6 - Colombo

Edges of Galle Face Green

The green, itself, is a lawn principally of *Cynodon dactylon*, but with a number of weeds, including *Borreria* sp.?, *Hedyotis* sp., *Eragrostis amabilis* etc. prostrate from mowing. Around the inner edges along the fence of the military reservation, a number of weeds make up a mixed vegetation.

76819 *Hedyotis* ^{*Oldenlandia umbellata* L.}
common in weedy places

Along the railroad tracks in the Fort area *Boerhavia* is very abundant. When left undisturbed it carpets the ground and the extensive diffuse leafless inflorescences form a layer 15 or more cm. thick above the mat of leafy parts of the plant. This is very different from anything observed in the Pacific.

70 *Boerhavia erecta* L. (Det. D. Nicholson)
abundant along railroad tracks

Orange and pink varieties of *Lantana camara*, *Stachytarpheta indica*, *Sida* sp., *Tridax procumbens*, *Boerhavia diffusa*, *Mimosa pudica*, *Borreria* sp., *Hedyotis* sp., *Ipomoea pes-caprae*, etc. are common. *Scaevola sericea* grows along the fence. The *Ipomoea pes-caprae* is the same form as observed in Hikkaduwa and in Bombay.

procumbent; flowers lavender.

stems ascending, flowers whitish.

Ships anchor in part of lagoon directly in front of Male I., between it and several small lagoon islets opposite. Hugo Arlt anchored within 20 yards of shore, but in deep water. ^{30 ft deep} The lagoon front of Male I. is walled up and built into an inner harbor for small boats. English flying boat tied & buoy about 50 yards from shore.

Most of the wall masonry is rough, but the part immediately around the entrance is concrete.

The wall is said to be 300 years old. Except for the concrete part at the entrance it is made of stone without mortar and must be repaired after each monsoon. During the S.W. monsoon the lagoon is very rough and protection for small boats is necessary.

Today the lagoon is like glass. There is almost no breeze. The sky is partially cloudy. Temperature and humidity are high.

Just inside entrance to lagoon is a small island with a few palm trees and a small building.

Cultivated plants seen in Male.

- Codiaeum variegatum*
- Mangifera indica*
- Jasminum grandiflorum*
- Mirabilis jalapa*
- Pseuderanthemum cantharidifolium*
- Jasminum* sp.
- Capricorn* sp.
- Acalyphaamentacea* v. *circinalis*
- Areca cathartica*
- Cordyline terminalis*
- Cibola* (butterfly)
- Carica papaya*
- Eugenia aquatica*? fruit eaten
- Persea indica*
- Persea oleander*
- Hymenocallis littoralis*
- Coreopsis*?
- Casuarina equisetifolia*
(trimmed into hedges)
- Piper betle*
- Pisonia grandis*? (doubtfully seen)
- Plumeria speciosa* (?) (Singapore)
- Phyllanthus niruri*?
- Coccoloba nucifera*
- Manihot esculenta*
- Hibiscus tiliaceus*
- Saccharum officinarum*
- Zizyphus jujuba*
- Triphasia trifolia*
- Cassia edulis*
- Thespesia populnea*
- Phoenix dactylifera*

Artocarpus altilis
Bougainvillea spectabilis
Moringa oleifera
Psidium guajava
Aleurites moluccana
Tecoma stans
Antigonon leptopus
Citrus sp.
Ocimum sanctum
Punica granatum
Annona
Catharanthus roseus
Lagerstroemia indica
Hippeastrum puniceum?
 (also vermillion)
Damiana samana
Peltophorum ferrugineum
Pseuderanthemum carmichaelii
 var. *atropurpureum*
Musa sapientum
Clerodendrum sp.
 (long tube - siphonanthus?)
Delonix regia
Pandanus sp.
 (large, edible fruit)
Pandanus sp.
 (small, lvs. spineless)
 ('kasima' prized for odor
 of staminate fls.)
Vitis sp.
Hibiscus - ornamental hybrids
Muntingia calabura
Melia?
Averrhoa bilimbi

Courtyards are covered by a smooth layer of a coarse sand composed of *Halimeda* fragments and a flat foram, shell fragments, etc.

Thespesia is the common tree along lagoon shores. Wood used in boat construction, for gunwales and free board. Lower parts ^{of boats} of coconut wood; 'herundu' is Maldivian name for *Thespesia*.

The general aspect of Male is one of extraordinary cleanliness and order.

The town is surrounded by an old wall just over 6 feet high. Similar, but lower, very well kept walls line all streets and separate gardens.

Most lawns are of *Lippia nodiflora*.

April 10 - Male Islet
coral soil in waste
places

- 36821 *Stachytarpheta jamaicensis*
occasional in open places
22. *Thuarea involuta*
open places
23. *Kalanchoe pinnata*
occasional
24. *Ochrosia oppositifolia*
occasional near outer beach
25. *Clodendrum inerme* (L.) Gaertn.
occasional near outer beach
26. *Ficus* ~~*imposita*~~ *imposita* Heyne?
one tree seen on playground
near outer beach
27. *Calotropis gigantea*
common
28. *Indigofera tinctoria* L.
common locally
29. *Noctua*
common locally on bare soil
30. *Euphorbia* ~~*prostrata*~~ ^{*darkleaves*} ~~*prostrata*~~ (Hodge) (Archer)
occasional or common locally
31. *Portulaca quadrifida* L.
very local

flowers deep blue-violet.

"malembu"

very prostrate, leaves
stiff.

erect leaves very fleshy.

"fatungas fala"

small tree; flowers
white, cyms ~~on~~
continue to flower even
after fruits are well
formed. "dumburi"

low shrub; leaves
fleshy; flowers white
with maroon stamens
and style. "dungeti"

spreading tree with
round crown, sterile.

"fidi" "fili"

shrub to 2 m, tall.
corolla and corona purple.
follicles fleshy at time
of dehiscence. "muwa"

low shrub, flowers
dull salmon color.

"gubunbida"

prostrate, deep purple.

"binghima"

prostrate, fleshy, purple.

"makumu fidi"

36832. *Hibiscus tiliaceus*
common on seaward flats

33. *Terminalia catappa*
occasional in scrub
at top of seaward beach

34. *Scaevola sericea* Vahl
dominant in scrub
at top of seaward beach

35. *Premna obtusifolia*
common in scrub at
top of seaward beach

36. *Guettarda speciosa* L.
Occasional in scrub
at top of seaward beach.

37. *Wedelia biflora* (L.) DC.
Common in ^{inner} edges of
scrub at top of seaward
beach

38. *Albizia lebbek*
one tree seen on open flat
at end of island

39. ~~Boerhaavia~~ *Merreria dissecta* (Jacq.) Hall. f.
climbing in scrub at top of
seaward beach

40. *Cyperus rotundus* L.
low waste ground near lagoon

well-formed tree with
erect trunk, rounded
crown. flowers yellow,
turning red, center
maroon. "di ka"

tree 5 m. tall; flowers
white, fruit immature
sharply bicaudate. "mididi"
shrub 3 m. tall; flowers
purplish toward center;
fruit white fleshy.
"magu"

large shrub or small
diffuse tree, aromatic
when broken; flowers
greenish white, fruit
turning blackish.
"dakaada"

small tree, 4 m. tall,
flowers white; fruit immature.
"wuni"

spawling resinous
smelling herb; flowers
yellow. "miru"

enormous spreading
tree, fruit not quite
mature. "ritika"

herbaceous vine,
rather extensive; corolla
campanulate, white with
carmine center.

colony spreading from
deep rhizomes. "dandukari"

36841. *Gossypium herbaceum* L.?
occasional

42. *Datura metel* L.
occasional

43. *Ricinus communis*
common

44. *Amaranthus viridis* L.
common

45. *Ficus infecta*
occasional

46. *Lida humilis* Willd.
occasional

47. *Portulaca oleracea*
common in open places

48. *Fimbristylis cynosu*
common in open bare places

49. *Turnera ulmifolia* L. var. *elegans* (Otto) Walp.
common

50. *Euphorbia heterophylla*
very common

51. *Synedrella nodiflora* (L.) Gaertn.
common locally

52. *Thespesia populnea* (L.) Sol. ex Forst.
common generally, especially
along lagoon shore
(to p. 130)

shrub 2 m. tall.
"otakaifa" "ok kafa"

low-spreading gray-green
herb, flower pale
cream color.
"kudu orani"

shrub to 2 m. tall.
"raing amanaha"
eaten "masagu"

banyan-type tree, but
multiple trunks and
aerial roots not much
developed. "dumbu"

prostrate, flowers orange.
"nodikka"

prostrate, fleshy,
brownish green. eaten
by people as potherb "raidgeda"
densely caespitose, roots
with pleasant peppery
odor.

herb up to 0.5 m. tall,
branching; flowers
showy, yellow.

herb up to 0.7 m. tall,
milky; bases of bracts
scarlet.

flowers yellow.
"mirihavan kandi"

tree 8-10 m. tall, flowers
yellow. Wood used
for freeboard of boats.
"hirundu"

1956 Maldives

Information from Mr. Ibrahim Ali Didi
Hurricane near end
of 1955 blew down coconut
and breadfruit trees.
Threw up large stones
on to reef, built a
natural breakwater.
Velledu I. or Milledum
Maddu South Atoll
is a length of 200-300 feet
long, 30 feet wide on
reef sufficient to
shelter small ships.
Took about 3 months
to open an entrance
for ships through this.

Several other islands
affected the same way.
This breakwater formed
in 2 hours. Would have
taken a thousand people
a year. Mainly of
small stones and sand,
a few large stones.

One island had a passage
cut through it - 8-10 yards
wide, fishing boats can
pass through. Molladu I.,
Tilladum Mate Atoll.

Elephantiasis

Leprosy

Patients isolated

Venereal diseases

unknown in Maldives
60 years back, came
from outside, spread
very rapidly.

Mosquitoes formerly
not very troublesome, but
in recent decades have
become very much so.
Do not seem to respond to
ordinary precautionary
measures such as
covering standing water,
cisterns, etc.

Crows occasional on Male.
Not found on all atolls, only certain.
Land crabs and hermit
crabs common. Here the
crabs not only eat the flesh
of the pandanus fruit but
bite open the cells and eat
the seeds, too.

Two examples seen of
a large heron resembling
the great blue heron on Male I.

April 10 Male I. (old)

76893. *Paspalum vaginatum* Sw.
local back of lagoon shore
54. *Sida humilis* Willd.
~~is~~ rare in dense weedy
soil back of beach
- 3 55. *Emilia sonchifolia* var.
common in dense weedy
soil back of beach
- 2 56. *Phyllanthus debilis* Kl. ex Willd.
~~var. minor~~ ^{det. P. debilis}
common in weedy place
- 2 57. *Hedyotis umbellata* (L.) Lam.
common in dense weedy soil
back of beach
- 2 58. *Lippia nodiflora* L.
common in dense weedy
soil back of beach, also
generally elsewhere
- 2 59. *Boerhaavia erecta* L.
occasional
- 2 1 60. *Eragrostis amabilis* (L.) W. & A.
common locally
- 2 61. *Phyllanthus amarus* ^{det. P. 761.}
occasional _{OK P. debilis}
- 2 62. *Indigofera tinctoria* L.
occasional
- 2 63. *Cleome indica* (L.) Gaertn.
common
- 1 64. *Pennisetum Brachiaria subquadrifera* (Trin.) Hitchc.
occasional in dense weedy soil.
- 2 65. *Tridax procumbens*
very common, generally

- forming a loose mat,
sterile.
- prostrate flowers
pale orange.
"weodikkha"
- leaves glaucous,
somewhat fleshy,
flowers pinkish purple,
only slightly exceeding
involucres. "hiri kulla"
"kaalu kumbo"
- prostrate, flowers
white. "erumudi"
- very prostrate; flowers
white. "hiri dati"
- "burundagani"
stems ascending;
flowers pinkish.
"tumbuli vira"
- low stature may possibly
result from trampling.
flowers salmon.
"fang hiti"
- "vira" (small grass)
- "onovira"
- ray-flowers white
"mavira"

36346. *Alysicarpus vaginalis* (L.) DC.
1 common in dense weedy
sod back of beach
- 1 67. *Euphorbia hirta* L.
common
- 2 68. *Nothosacra brachiata* Wight
common in dense weedy
sod back of beach
- 1 69. ~~*Euphorbia*~~ *Boerhavia repens* (L.) ^{(abnormal} ^{proliferally attached by rhizome)}
rare in dense weedy sod
- 1 70. *Boerhavia repens* L. ?
rare
- 1 71. *Acalypha* ~~*lanceolata*~~ *lanceolata* Willd. ?
locally common
- 1 72. *Acalypha Micrococca mercurialis*
rare
- 1 73. *Phyllanthus modestus* L.
common
- 2 74. *Vernonia cinerea* (L.) Lam.
common

April 10 - Male Islet,
cultivated in gardens

- 1 75. *Zizyphus jujuba* (L.) Lam
- 1 76. *Eugenia* ~~*agave*~~ *javamica* Lam
- 1 77. *Phyllanthus niruri* Bull.
- 2 78. *Pseudanthemum cantharidifolium* (L.)
C. B. Cl.
- 1 79. *Cordia alliodora* variegatum

- prostrate
- flowers white
"mirinting"
- prostrate, flowers white.
"kuduhuphiya"
- prostrate, purplish.
"bununda gondi" (different form)
- prostrate; flowers pinkish.
"bununda gondi"
- 72 somewhat succulent
- 72 "kuduhiti"
- 74 flowers purplish.
"waluhapa"
- 75 small tree; fruit edible.
"kumina"
- 76 large tree; fruits white,
juicy, pleasant flavored.
(also a pink fruited form)
- 77 diffuse shrub, straggling.
leaves at top, slightly variegated.
- 78 shrub 3 m. tall. corolla
white, crimson dotted at throat.
- 79 common many forms
cultivated "dampai bagita"

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1956 Maldives

34380. *Acalypha amentacea* var.2 81. *Jasminum azoricum* L.2 82. *Jasminum* ^{officinale f.} *grandiflorum* (L.)
Kobuchi

Male Atoll

135

low shrub. leaves
 reddish. "~~baguitta~~"
 climber, flowers white,
 very fragrant. "glanura ma"
 climber, flowers white,
 fragrant. "wandu ma"

Apr. 11 - Anna I.

Small islet in lagoon with rather sparse growth of coconuts, a few fairly large trees (*Pisonia*?) and a rather irregular row of *Pemphis* etc. at top of beach. Interior seems rather open. As far as can be seen from 300 yds away to east, the entire islet is sand. North end has no coconuts, but low mixed scrub forest. This rather open.

A seal said to have been found and killed on Nilander Atoll. (Atoll F) Not known in Maldives previously. ~~Pieces~~ Pieces of skin brought to Male.

Once a crocodile was found on Milladur Madu Atoll (Atoll N).

Turtles are protected. To kill one a permit must be secured from Male.

Said to be two varieties of edible Pandanus.

Domestic animals - chicken, cows, goats, cats

April 11 - Kuda Badoo?

Largely covered by coconut grove. Fringe at top of beach of *Hibiscus tiliaceus*, with *Hernandia sonora* back of it.

A small home-site - 2-3 people stay here. *acca* and *Crinum* in dooryard.

A few small breadfruit trees but these look rather chlorotic. One *Pontederiacae* indiana.

Ground rather bare in much of grove, casting of earthworms(?) very frequent.

Tacca seems general in interior.

Nostoc common in open places.

Pandanus tectorius or something similar occasional - very long leaves.

Strip of scrubby wood back of top of beach largely *Hibiscus tiliaceus* with *Guettarda*, *Pemphis*, *Hernandia*, *Calophyllum* & *Messerschmidia*. A little *Suavea*, *Tournefortia*.

In the interior are scattered trees of *Hibiscus*, *Calophyllum*.

Pandanus.

In openings patches of
Solanum.

Young coconut seedlings
in open places.

What appears to be
Thalassia sea weed large
scattered in plantation
Also some Morinda, Crinum
and Tacca general but
not forming a dense
cover. Lida occasional.
Abutilon occasional.

The entire islet seems
composed of fine ~~sandy~~
sand with some coral
fragments. The general
level is about 1 foot above
high tide and a small
escarpment is cut
at high tide level.

Some pumice found
on beach but not
abundant. In about
30 m. the land becomes
lower so that the interior
level scarcely could
be much more than
high tide level.

In the interior the soil ranges
from dark brown to black when
moist. This is at least

30 m or more deep. In it are
abundant pieces of phosphate rock also a surface

For firewood *Quettarda*,
Hibiscus tiliaceus, *Terminalia*,
Leucaena, dead coconut leaves.

General evidence of
burning of coconut trash.

A few small *Achras*
oppositifolia in interior
A patch of *Turnera* near
house. The *Crinum* is
all sterile - small plants
like small forms of *Crinum*
asiaticum.

Pandanus in interior
has large heads, oblong
perhaps 1 foot by 3". eaten
~~large~~ "karikio".

Small sp. called "bokio"
not eaten. Here only at top
of beach.

On south side the beach
is eroding away, exposing
an extensive mat of coconut
roots. Water sloshes up
far under the sand among
these roots. Shallow water
with sand bottom extends
out about 25 m. suggesting
this much erosion. Coconut trees
apparently uninjured until they fall over.

Chickens are abundant and
scratch up surface soil.

In the lagoon are bands of reef and large patches, but no small patches seen. They are said to occur frequently, though. The large patches and bands are conspicuously sandy, with irregular growths of coral.

April 11 - Furamafuri I.
Islet on reef - inner shore a sandy beach.

Coconut trees rather few, much scrub forest. *Pernambus* common especially around outer and south shores, *Scaevola* on inner shore.

Well near center of islet lined with concrete - water level about 3' above ground level. Water perceptibly brackish but drinkable. Not used for drinking.

Pandanus here, even in interior, small inedible species, except one ^{tree} near house. On north ^{side} of islet:

General shrub layer about 2 m. high, mostly *Scaevola*, some *Quettarda* ^{tree} ~~tree~~ sapling *Occhrosia* seen.

Scattered trees of *Pernambus*, *Terminalia catappa*, *Pandanus*, a few *Pernambus*, *Messerschmidia*. In open or sparse places, *Wedelia*.

Herbaceous layer
scarcely developed.
Some *Timbrictylis cynosuroides*
in open place, some
Borhanis.

Near ^{seaward} outer end of
small clump of
mangroves - apparently
growing on a dry
pebble ridge just
back of beach.
Seems that a storm
may have filled the
coral gravel in around
these trees, as normal
bases not visible -
trunk simply protrudes
from gravel. Largest
trees dead, medium
ones very sick looking,
smallest look healthy.

Outer end of islet
a loose pebble flat
covered by a thicket of
Pemphis, *Cordia* and
Pandanus. No under-
growth but many
dead *Pemphis* branches.
Some pebble lined pools
with mangroves just
back of sharp beach ridge
varying from pebbles to
cobbles, very sharp, unworn

fragments. Some young mangroves
^{under trees}.
Thicket varies toward
south side becoming
locally dominantly
Cordia, then *Cordia-Pemphis*,
then *Pemphis*. On south
shore are giant old
Pemphis stumps, cut
back many times -
very bushy, up to several
feet diameter.
Cordia same habit,
even larger.

No sign of platform
except that about
30 out from shore (at
high tide) are some much
eroded remnants of
rock with points
protruding above high tide.
This whole end of the
islet is coral gravel.

Inner end of islet seems
more luxuriant, possibly
because of sandy soil.
Here the trees are mainly
Hibiscus, *Calophyllum*,
Ficus, *Terminalia*,
and large ~~stems of~~ *Pandanus*.
Some mangroves and a scrubby
lime around house, large ~~stems of~~ *Pandanus*.

Two crows seen here. From a distance what appeared to be a flock of white terns, but did not get close enough to be certain.

Fanucolafuri Islet - on east reef.

Central part a dense grove of coconuts, open to the lagoon beach except for a few scattered bushes and small trees.

The grove thins toward both ends so that the fourth part on each end is noticeably sparse and with a pronounced scrub or scrub-forest, probably mostly Pemphis, lining the shore and covering the ends of the islet.

This is especially dense on the southwest corner, seems a bit 'windsheared', possibly effect of southwest monsoon.

Interior of grove in center looks rather dark. At one point the outer shore can be seen under the trees from the lagoon.

The coconuts on the end are very small trees.

Sandy beach may be seen the entire length of the lagoon side, but in the center a mat

of coconut roots is being undercut by waves.

Lagoonward from this islet and others along this reef is a second belt of reef a hundred yards or so wide. This is separated from the wide outer reef by a belt of blue water twice or more this width.

Today the weather was scorching hot and so near a dead calm that it was scarcely possible to keep a sail filled for long enough to get any push from it. There were only a few tiny flecks of cloud. At about 4 or 4:30 slightly more of a breeze came up, as well as a few scattered larger cumulus clouds.

~~Thali~~ Fulule I. - also along outer reef - densely planted to coconuts but has an avenue cut longitudinally. North end has low scrub with only small coconut trees, Pemphis in clumps and as isolated trees, as

well as some long rows along
much of lagoon beach.
Leasvols in most of the
intervals. In center a short
stretch of open beach where
houses are. Some places
show beach erosion and
suspended mats of coconut
roots - this where unprotected
by Pandanus trees. South end
has coconuts almost to tip.
Hululu has an avenue cut for its full length.

Small scrap of land
south of this on reef has
only scrub. (Keane Islet)

April 16 - Kuda Badoo Islet

sample bag contains
pumice picked up on
beach, phosphate (?)
rock found abundantly
scattered over soil
in interior of island,
brown soil taken 6-8" down
from the surface in an
apparently uniform layer
over 1 foot thick but of
undetermined thickness,
~~black soil~~ this from
a semi open place ~~30 m~~
back of beach on north
side of islet; black soil
from 8-10" depth in an
apparently uniform
layer more than one foot
thick in coconut plantation,
apparently the usual
soil in the plantation;
and a sample of beach sand
from the north beach.

36883. *Tacca leontopetaloides* (L.) O. Ktze.
very common throughout
coconut plantation

84. *Hibiscus solandra* L'Her.
rare in plantation

85. *Moringa oleifera* Lam.
one tree in plantation

tubers used to make starch.
"hit tala"

erect

sterile tree 4 m. tall
leaves and fruit eaten as
potherb "moringa"

- 36886 *Cyperus conglomeratus* Rottb.
one clump at top of beach
of fine calcareous sand
- 2 87. *Calophyllum inophyllum*
common in and around
coconut plantation
- 2 88. *Morinda citrifolia* L. *bracteata*
occasional in ~~plant~~
coconut plantation
- 2 89. *Hernandia sonora* L.
common in beach
ridge scrub forest
- 3 90. *Luriana maritima*
occasional at top of beach
- 2 91. *Pemphis acidula* Forst. f.
abundant ~~at~~ at top of
beach, growing in sand.
- 3 92. *Messerschmidia argentea*
occasional at top of
beach, rare inland.
- 2 93. *Cassytha filiformis* L.
climbing over trees,
not abundant
- 3 94. *Dolichos lablab* L.
climbing in bushes and
trees and creeping on ground
in open or partially open place
- 1 95. *Cassia surattensis* Burh. f.
rare, in semi-open places.
- 1 96. *Flagellaria indica* L.
common in coconut plantation

- caespitose, erect;
spikelets very pale.
- 2 small tree "funa"
wood useful.
- shrub 1.5 m. tall,
"ahi"
- tree 6 m. tall, leaves
glossy, firm; fruit
surrounded by loose
fleshy inflated envelope,
orifice circular, not toothed.
- "kandhi"
shrub 1 m. tall.
"halaveli"
- densely branched shrub;
flowers white. Wood
used for keels of boats. "kuredi"
- shrub 2 m. tall; leaves
pale silvery green, flowers
white. "bori"
- stems green to yellow;
fruit green. ~~"vela buli"~~
"vela buli"
- flowers magenta,
keel straight, white.
"du himeri" ^{name} beaten by some people.
- shrub 1 m. tall, sterile.
"rana ura"
- erect very young shoots
common, no mature
plants seen. "viballa gondi"

- 36897 *Abutilon indicum* (L.) Sweet
occasional in coconut
plantation
98. *Crotalaria retusa* L.
rare in coconut plantation
99. *Pandanus forsteri* ^{or John holotype}
occasional in coconut plantation
- 99a (fruit from market in Malé)
↳ Probably related *Pandanus dumpacensis*

Calymperaceae

- 99b moss *Calymperes hypophylaceum* C. Müll.
base of coconut trees

99c *Phlegmaphysa* ^{det. H. A. P. 11.12}
collected this

- <sup>"ma gulu"
leaves eaten
in many</sup> erect, scarcely branched
weak shrub; flowers
orange, mostly caducous.
erect herb 1 m. tall;
bud yellow, pinkish
without. "vihariguni"
large-stemmed tree
up to 6-8 m. tall; leaves
to at least 4 m. long;
fruit head oblong, at
least 3 dm. x 1.5 dm. none
seen mature (key picked
up on ground nearby);
fruit said to be edible.
"kanikis".

Pac. Sci.
15: 251, 1961

This is something of
the *P. tectorius* relationship,
but probably distinct
from *P. tectorius*. Has apparently
nothing to do with the
small fruited wild
plant seen growing
around the beach ridge.

April 10 - Furannafunililet
 36900. *Barringtonia asiatica*
 2 one large tree and
 many seedlings in
 thicket in front beach

2 01. *Boerhavia* ^{repens L.} ~~diffusa~~ ?
 common along trails
 in sparse coconut plantation

02. *Ipomoea tuba* ?
 very rare in *Cordia-Pamph*
 thicket

5 03. *Bruguiera* ^{cyathodica (L.) Bl.} ~~perrillana~~
 common around saline
 pools near outer end of islet

2 04. *Morinda citrifolia*
 occasional in coconut
 plantation

1 05. *Cordia subcordata* Lam.
 rare along beaches,
 abundant in thickets
 on very stony ground,
 seaward end of islet.

tree 3 m. tall, widely
 spreading; fruit
 4 sided, up to 8 cm. diam.
 abundant on ground,
 chewed up by crabs.
 "kimbhi"

all plants seen were
 of this form, no extensive
 creeping ones seen at all.
 "buranda gandi" root eaten.
 twines; sterile.

small tree, flowers
 cream color. "kanduk"
 and eaten.

shrub 2 m. tall;
 leaves glossy; flowers
 white. "ahi"

small tree, flowers bright
 orange red (not collected).

Wood much used. Many
 enormous ^{sprouting} stumps
 of pollarded trees. "kaoni"

April 12 - Male Islet

36906. *Lemna oligorhiza* Kunz?
 covering surface of
 water in well in guest
 house yard, water
 about 1 m. below surface
 of ground.
07. *Averrhoa bilimbi*
 commonly ~~cult~~ planted
 around houses
08. ~~Albizia~~? *Agadirachia indica* A. Juss.
 planted
09. *Hedyotis umbellata* (L.) Lam.
 common in grassy area
 on top of old fort.
10. ~~Cassia~~? *Loureaa pinnatifida* Cass.
 common in grassy area
 on top of old fort.
11. ~~Legume~~. *Indigofera emneaphylla* L.?
 common in grassy area
 on top of old fort.
12. *Cyperus bulbosus* Vahl
 common in grassy area
 on top of old fort.
13. *Muntingia calabura*
 in crevice in wall of old fort.
14. *Pilea microphylla*
 in crevices of walls along street
15. *Lapsonia inermis* L.
 planted in park

Leaves said to be crushed
 in mills to impart a red color
 to palms of women's hands.

- small tree; flowers
 on larger branches, very
 dark red.
- spreading tree; flowers
 white, very fragrant. "hiti".
 prostrate; flowers white.
- leaves glaucous, rather
 fleshy; flowers yellow.
 Used as pot herb. "hula fila".
 prostrate; flowers
 bright red.
- roots and tubers very
 fragrant, sometimes used
 as incense. "gole kulanduru".
 small shrub. Fruit eaten.
 "jaam"
- fleshy. yellow-green.
- small tree 5 m. tall;
 flowers with petals yellow,
 odor said to be very good
 in morning, at midday
 not especially pleasant.

36916. *Pandanus maldivicus* ^{can} St John (see 36917)
forming thicket ^{on} back of
beach.

April 10-12 - insect collection
all from Male Islet except the
worker ants ^{and coconuts}, which are from
Funanafuni Islet. The
ants ^{and coconuts} were on vegetation.

The Male I. collections were
from around lights except
the two millipedes (?) which were
around the roots of plants.

The scorpion was crawling
in the house.

General observations on Male Atoll:

No remnants of platform
seen.

No beachrock seen.

Beach erosion active
in various places, exposing
mats of coconut roots
and undermining them.

Most reef surfaces
covered by sand.

East reef very wide.

small tree, 4-5 m. tall,
stems slender, with tendons
for leaves to persist and
clothe stems; fruiting
head cylindrical, turning red
on ripening. Not eaten
or used for anything. "bokio"

There are several kinds
of lizards, including
a very fierce looking little
monitor (?); the common
house gecko is frequent.
No Maldivian name for
lizards, according to
informant.

Birds are very scarce.
Rats are common.

Pemphis and *Luriana*
both grow in sand, the
Pemphis by far the most
abundant.

Around islands planted
to coconuts there is usually
a border vegetation of
bushes or small trees.
Ends of islets tend to have
fewer and smaller coconuts
and much scrub vegetation.

Male Islet, proper, has 8000 people.

The economy is still out of balance but is improving. More fishing boats are being built.

The exports are

Maldivian fish.

Coconuts (export to India)

Copra (some doubt about the coin fiber and

cowrie shells.

The principal imports are:

rice onions

flour chilies

sugar curries material

tea

non-food items

In 1954 the export of Maldivian fish was 34776 cwt

In 1955 35341 cwt

Maldivian fish is produced on all atolls, especially Fadifol.

It is bonito. The fish is boiled in water with a little salt. Then it is smoked 12 hours or more, then dried in sun a week or more. When ready to bag for shipping it is sprinkled with ash.

The Maldivian alphabet is 500 years old, is peculiar to the Maldives. It is read from right to left.

Printing done in Malé is apparently by some sort of lithographic process.

During the 3 days, April 10-12, the weather was hot, very much so during the day, slightly cooler at night but not cool, and an absolute dead calm.

This was said to be rather unusual, even for this season.

In recent years a shortage of bait-fish for catching bonito.

April 16 - flight from
Colombo Airport eastward
to Singapore

Country south ^{and east} of
Colombo is mosaic of
coconut plantation, with
trees in regular rows,
mixed coconut and
jack fruit and breadfruit,
and rice paddies.

The rice paddies form
an intricate dendritic
pattern following
the drainage lines -
the valley bottoms
are flat and checked
into individual patches.

The land between
is rolling, gradually
becoming more hilly
eastward.

A very few miles to the
east the hills get high
enough to have patches
of second growth and
shifting cultivation.

Then a series of north
and south ridges with
first, some forest, then
a mixture of tea plantations,
clearings, and patches of
woods. Inland the tea
becomes more and more
dominant. Then clouds

cut off the view until
the higher mountains are
reached.

These emerge from the
clouds west of Adams
Peak. They are mostly
in tea, with small
patches of wood and thicket,
bare rock cliffs, and
apparently rather continuous
forest in the crevices of
ragged mountains
immediately surrounding
Adams Peak.

The lower hills south
of this are mostly in tea,
with some shifting
cultivation and patches
of grassland.

Eastward of this the
same pattern continues
with a few higher hills
wooded. The higher
mountains southeast
of Adams Peak are
wooded, their slopes largely
in tea. South eastward
is a basin with small
hills covered with tea, patches
of thicket, shifting cultivation,
and some rice in the valleys.

Eastward the higher
mountains have more
and more grassland in

their slopes, wooded near summits and in ravines. Upland plateaus tend to be partly grassy.

The lower country to the south of this is at first an irregular mosaic of wood and clearings, with probably some tea. Then, as flatter country is reached, this is generally wooded, rather evenly except for large patches that appear to have been cut over and grown up to dense thicket. Hills here seem to be covered by scrub forest with rocky outcrops bare or grassy. Perhaps the large patches are prehistoric "tanks" or reservoirs, as one or two of similar shape have water in them.

Farther eastward the country is very flat. There are patches of shifting cultivation and various stages of regrowth, some obvious old dry "tanks". Far to the north the hills and mountains have become more grassy.

Here and there in the flat

country just south of them are what appear to be clusters of small grain fields of a tan color.

The forest, locally varied by shifting cultivation and small light brown patches, continues eastward.

It becomes thinner and with drier aspect, eastward. Terrain is generally flat with scattered abrupt small hills. These become fewer eastward.

Then the forest becomes deciduous in parts in a broad valley near the coast, with green forest on higher ground. Some open country in this valley looking like tidal marsh. Broad strip of reddish tan dunes at ~~the~~ river mouth, continuing much narrower northward.

Northward just back of coast a series of small round lagoons. North of these are ^{light} green patches (reefs?) in similar position.

Most of country northward as far as visible is wooded, except for these light green patches.

April 14 - Enroute Colombo to Singapore

At 11:25 (Colombo time) passed over a fair sized island, low hilly, appearing largely wooded but with some grassland and clearings in its southern or southwestern parts. Mostly obscured by clouds. *Sinemulace* ?
~~East coast of the~~ Northeast coast of this island very irregular and with various tiny islets. Many small clearings and patches of grassland near coast, good forest inland. Eastern part or perhaps southeastern with larger grassland areas, also with some small areas of mangrove, especially between main island and a ~~small~~ small satellite directly east.

Surnatna - the south coast is low, with a cleared, or at least relatively open strip back of the beach and sloughs paralleling the beach. The mouth of a large winding muddy river, with a hook-like delta and a village with cleared land at its mouth. One branch of this river comes from the north or north-west, tightly meandering, another from the east, meandering but less so.

The general lowland country is densely forested, but with some clearings and a village or two along the rivers. Some small dark streams meandering in the coastal forest. Clouds more and more frequent inland. Country forested as far as can be seen.

Country becomes hilly, still forested but with some cleared grassy areas. These mainly seem to be on lower slopes of valleys.

Thick high cumulus clouds in interior of island, many

thousands of feet high.

Eastward is an area that seems to be a plateau or peneplain cut by ravines. This is largely grassland with ravines wooded.

South of it wooded hills. Then more clouds.

Then large open areas with roads and villages, some forest on hills, some bright green rice in flat valley bottoms.

Then a gently eastward sloping plateau going down toward the coast.

Mostly grassy, with small ponds. Cut by several deep valleys with flat bottoms, green with rice. Coast is hilly, hills brownish grassy, with green flat land between hills. Many villages.

Turning slightly, following coast more or less the same sort of country continues. The plateau becomes more intricately dissected. Little wood in ravines. Ravine bottoms tend to be flat and in rice, though

many have no flat land. The plateau itself is generally in grass. Eastward, as nearly as can be seen through the clouds, it ~~loses~~ gradually loses its identity and merges into wooded hills with patches of level plateau covered with grass, large irregular patches.

Then clouds, high, low, irregular cumulus.

Through occasional breaks in clouds country seems hilly, wooded, with in places open ridges, large cleared areas.

Then rather flat country partly cleared, with a meandering very muddy river, winding and then turning northward to coast where it enters a broad estuary shared with another large winding river from more to the east.

The flat lowlands back of this river mouth are densely forested except for strips of green

rice along the rivers and their ex-bows.

The general color of the forest is very dark dull green thickly dappled with lighter tree-tops.

Visibility rather poor near coast. Some clearings just back of coast.

Small meandering streams reaching coast are pouring large amounts of mud into the sea. - conspicuous brown patches near mouths of some, entire shallow coastal water a café-au-lait color.

Some of these coastal estuaries drowned, with numerous very short lateral branches.

Land mostly wooded, some clearings. Apparently mangroves along streams but hard to be sure.

No beach apparent along this entire coast, so probably whole dark-colored coastal forest may be mangrove.

West end of large island presents a banded appearance with at least two wide strips of forest separated by light green strips of about equal width. These look

in outline like the channel separating a small ^{slightly} crescent-shaped islet from the big island and parallel with the green bands. On the inner green band is a sizeable settlement. Back of this, the island seems to be unbroken forest. Seems essentially flat and without rivers. Clouds make visibility rather poor.

Eastern shore of this island muddy also and without beaches. Certainly mangroves here. A small stream discharging a great amount of mud. Some lighter green area, possibly marshes or some sort of swamp, just back of shore.

Band of sparse mangrove actually growing out in shallow offshore water.

Where the mud comes from in the small streams on this island is not clear, as there is no apparent disturbance of the forest, and no large gradient to give streams much cutting power.

Curved shore of same island (?) swings eastward again. Same general pattern but lacking marshes and with several larger estuaries.

In this vicinity much cleared land - in rice? or some sugarcane? Many ~~very~~ meandering streams and estuaries here, with considerable rice (?) or sugarcane land as well as forest between them. Coastal waters muddy. Mangroves along coast and estuaries. Complicated mud- or sand-bars near mouths of estuaries.

April 16 - Approaching from west along coast toward Singapore.

The shores, at least westward exposed ones, have beaches.

Slopes back of them largely open. Too far away to be sure if grassland or planted. Dark forested strips must represent rivers or areas of swamp. Inland obscured by clouds.

A number of tiny wooded islands offshore.

More forest eastward but many large angular cleared areas. Beaches no longer apparent. Stream mouths rather muddy. More forest, probably swamp, and a large meandering estuary with a small city on its south bank, with obvious plantation land with rectangular pattern south of it all along coast, two main roads parallel to coast a little back from it.

Inland some ugly scars which may be tin-mined. Land is irregularly cut up.

patches not as regular as nearer coast. But probably rubber.

Coast turns sharply more eastward, lined by a broad belt of mangrove. These backed by plantations, judging by roughly rectangular pattern, probably rubber, extending inland as far as visibility goes. Much of this, however, could be forest, as haze is rather thick. Some low low wooded hills inland. Another large estuary with city east of it. Much open land, apparently grassy inland from city, some wooded hills, then plantations. This on north side of ~~Malacca~~ Strait, on mainland.

Much apparently grassy land here, interspersed with large and small often angular wooded patches or patches of rubber. Then large area of plantation land, with a straight canal running east and west, ending eastward at a small crooked stream. Some wooded hills in plantations just to north. Then some rice land eastward.

then forest, with some cleared areas, especially northward, apparently grassland.

As plane turns southward country becomes partly cleared, partly wooded, in rather large patches, clearing becoming more abundant.

Then wooded hills with large reservoir. Then large areas of plantation ~~forest~~ and large red or green cleared areas, then mostly plantation, with some clearings.

Then extension of city as ~~Singapore~~ ^{Johore} Strait is approached. Singapore Island very much cut up into clearings, small and large patches of rubber, forest, grassland, patches of buildings and houses. Soil bright red.

City on far side of island. Parts of it have trees but few downtown, or in slummy crowded areas of small houses, or in areas of new apartment buildings. Much shipping in harbor.

April 17 Bukit Timah forest.

Singapore

130 acres up to 580'

Unlogged primary rainforest.

Loose canopy 125'-150' occasional trees to 200' in ravines.

Fairly defined layers of shrubs and saplings 2-4 m. spaced 2-10 dm. slender. Rather little ground layer, these mostly seedlings. Rattan scattered in shrub layer, mostly rather small, some very large. Litter layer continuous but thin. Soil gray-brown, no humus layer.

Ferns rather rare except along trail.

Some of second layer trees are *Quercus lamponiana*. With species of oaks also found. (Would probably be *Lithocarpus* stiff, staminate spikes, a curved leaf, cup & round umbella shaped crown).

Taller trees, by far, in ravines. Shorter on ridges. Shorea has beautiful lined clean trunk.

♀ flying squirrel clinging to trunk of tree half-way up.

rainfall about 100"

Looks like burn on tree perfect protective color.

No good separation between top and second layer about 120'.

Plants fairly thickly distributed but not forming continuous canopy layer. Some are buttressed. The second layer not continuous either, but together they in most places cover the ground almost completely.

Epiphytes and creepers common but not abundant. Ferns abundant along trails in this place, etc.

Large area of mixed fresh water swamp, secondary forest and hill tops with original large trees around reservoir forming water catchment area. This nearly 4000 acres, a part of nature reserve.

[Corner may have an unpublished description or phytosociological study of this forest.]

April 17 - Singapore

- 36917 *Emilia*
bare ground near botanica garden
- 18 *Diananopteris curranii* Copel. det Holttum
Gleichenia
open hillside below
Pulit Thomah forest
- 19 *P. boryi* Gaud. acc. St. John Pac. Sci. 12, 18, 1911
Pandanus tectorius
edge of "dry" mangrove
swamp.

The "dry" mangrove is a tidal swamp, high enough to be emerged much of the time. A tangle of *Burquiana*, *Pandanus* (several spp. incl. *P. cornii*), *Dalbergia*, *Hibiscus tiliaceus*, *Escaecaria*, *Podocarpus* (!), etc.

Unfortunately highway construction, rounding off a curve in the highway, has all but eliminated the only known colony of *Pandanus cornii*, a curious species with a erect, boat-shaped leaf tip, very low habit and small fruit.

erect, flowers ^{pale} pinkish, lavender.
(seeds sent to Baldwin)

forming tangles.

small tree, fruiting
head small, cylindrical.
red when ripe.

The low flat land near the airport is occupied by vegetable gardens and dwellings, ^{many} ~~some~~ coconut groves.

Low hills of red soil have some rubber plantations but many of these are in very poor condition. Much of this land is abandoned and covered by *Gleichenia linearis*, *Imperata cylindrica* and bushes.

A few patches are planted to pepper (*Piper nigrum*) climbing on stakes.

Some fish ponds in flat land near airport. Some small mangrove along straits of Johore.

April 12 - Flight from Singapore to Malacca. (Seaward side of island)

Along Strait of Johore, on Johore side, low-lying land is in mangrove, slightly higher areas in coconuts and some in rubber.

On Singapore Island mangrove along an estuary going up toward water reserve.

Water catchment area solidly wooded. Around it many hills with *Gleichenia*, a few cultivated patches, some dwellings, several ~~but~~ bright red erosion scars. Between this area and the Strait of Johore are rubber plantations, looking rather poor.

General pattern outside built-up areas is that hills are mostly bare with *Gleichenia* and brush, more level land in rubber, low places along strait in mangrove.

In the part of Johore across from Singapore toward Strait of Malacca the low flat land is mangrove. Most of the low hills appear to be in rubber, a few areas in grass (later

A large estuary just west is surrounded by an extensive mangrove flat.

North of this an area of what appears to be pineapple plantations, perhaps several hundred acres, with a few patches of rubber scattered in it. Some forest just east of this fruit mostly rubber. The rubber plantations have a dull drab-green appearance from the air. Difficult to be sure whether rubber or forest. North westward or westward toward the coast, are some areas of coconuts mixed with the rubber plantations. A few small patches of forest, in poor shape, partly logged and burned. Then large area of solid coconut plantation along coast and for some distance in, but with what seem to be patches of swamp back of the coast. Coconut plantations show pattern of parallel rows.

The coconuts extend for some miles, with the belt of swamp (?) just back of an immediate coastal strip of forest. This swamp(?) seems to be in

geometrical blocks, to have been cleared and in various stages of regrowth. May not be swamp but some form of shifting cultivation. The immediate coastal strip appears, on closer view, not to be coconuts but some sort of forest, evenly gray-green, perhaps *Casuarina* (?)

Coconuts continue along coast but becoming more and more mixed with patches of rubber and small cultivated areas. Locally cleared patches are very light colored, apparently sand. A few patches of mixed forest.

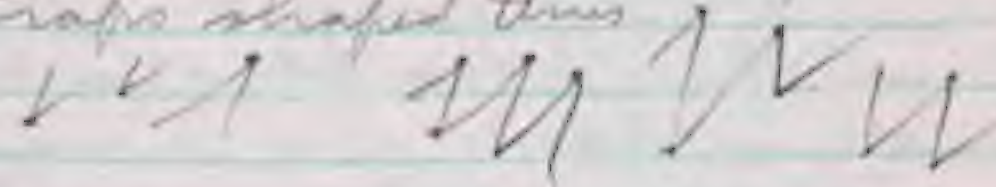
More and more mixed cultivation and villages.

Large estuary with some mangrove. Then coconut plantation with narrow coastal strip of forest. This may be mangrove, rather than *Casuarina* but looks more irregular than usual for mangrove.

Approaching large beaded coast has a wide mangrove strip, backed by either forest or rubber, then a road, then rubber. Beyond the point, clearing extends to the sea shore. The land is a mixture of patches

of grass, coconuts and perhaps rubber. Coconuts becoming more dominant northward. Then mixed with rubber patches. Here again a narrow belt of mangrove. The patches of coconut and rubber become mixed, mangrove backed by a belt of swamp (?) forest.

Then plane goes out over sea. Here in shallow green water, some conspicuous fish traps shaped thus



Then a number of small rocky islets, all wooded. These have a very narrow sandy beach at least on their southeast side.

Coast opposite these has a narrow belt of mangrove then a narrow belt of rice. Then coconuts. Some tiny patches of coconut mixed with rice or seaward of it. Then, northwestward, some large areas of rice and coconut, a red soil low hill conspicuously contoured. Then large area of mangrove and mupa swamps near Malacca.

North of Malacca most of the lowlands in rice, but patches of coconuts, mostly very small. Near coast coconuts are nearly continuous.

Hills inland between rice areas are wooded, perhaps rubber plantations. Large area of swamp forest inland from Malacca airport.

Also some young rubber.

Malacca airport - alt. 35' - flight Malacca to Kuala Lumpur

Inland is a mosaic of rice, rubber, small patches of coconuts, a few small forests, a few bare fields, with rubber becoming completely dominant inland.

The open fields are apparently being prepared for rubber planting. Some hills have areas of low brush.

Northward, small areas of rice following valley bottoms. Some patches of forest. Plane follows foot of mountains. Some areas of dark close woody vegetation - not clear what this is.

Northward, forest areas more extensive in low hills.

Open areas, conspicuously contoured occasional. Also recently cleared patches of forest. Mostly rubber of various ages. Land flats along a ^{reservoir} river that may be tin workings - partly revegetated.

Mountains on east side of plane densely wooded.

Northward, west side, still mostly rubber. Some open contoured fields (new rubber plantations?) and a few yellow-green grassy areas -alang? Some forest on hills. A few areas of rubber(?) completely defoliated.

Low mountains with good mixed forest, a few small patches of grass.

Northward almost solid rubber except for some small forest areas, larger in higher hills. More grassy areas northward.

Darker colored plantation in close rows - rows either straight or winding - not clear what this is.

Then a basin with extensive tin workings - ponds, sand or gravel pits, dumps, housing area with sheet iron roofs exposed around malleable.

Hills round about
grass and fern cover.

This just west of Kuala
Lumpur. Landscape
from air dominated by
the workings. Flats partly
revegetated.

April 18 - Malacca

36920

Ernilia sanchifolia
weed around airport.

April 19 - Bukit Bruang,
above Kepong, ~~Kuala Lumpur~~
Selangor

3

21

Eugenia

abundant in undergrowth
of hill dipterocarp forest,
especially on ridges, little
said to inhibit growth of seedling
of other species.

1

22

Shorea curtisii

~~Shorea~~ common in hill
dipterocarp forest

3

23

Mor.

common in second growth forest

3

24

Artis

common in "belukar" second growth

flowers light purple,
scarcely exceeding
involucre.

800'

250m

acaulescent, caespitose;
leaves ascending to erect,
distally arching, petioles
spring, especially to in lower
part, blade perhaps
twice as long, entire leaf
up to 5 m. long; inflorescence
erect, pedicellate, in center
of plant, up to 2 m. tall,
pedicel peduncle to 1.5 m. naked
at time of fruiting; fruit horizontal
enormous forest tree; leaves
tending to be grayish

1600'

59m

600'

190m

small tree in tangled
undergrowth, inflorescence pendent.
small tree, does not sting.

April 19 - Bukit Bruang,
ridge above intake
of Képong water system,
Kuala Lumpur.

Approach to the
intake, along the pipe-line
from the reservoir is through
"betuluan" or tangled
second growth that appears
after clearing. This is
a dense rather low wood
of *Masanga*, *Mallotus*,
Arenga, *Lapium*, *Musa*,
Angiopteris, a few *Cyathus*,
Artocarpus, *Scolochinia*, etc.
These are tangled with
quantities of vines, including
Mikania scandens.

Occasional old primary
trees may have been
left, scattered here
and there, their tall
branchless trunks and
umbell-like crowns
suggest their origin in
the ~~primary~~ primary
forest. Several soft
wood ~~species~~ species of *Phoea*
may come in while
the ground is still open
enough for them to ^{establish} themselves
~~persist~~. They are then
able to grow fast enough
to be able to overtop the *Masanga*.

Mallotus, etc. of the ~~old~~ Belukar.
If there are enough of
these the Belukar may
give way to something
resembling primary
forest.

The actual ridge,
itself, has not been
logged off, but has
had some hardwood
logs taken out 40-50 years
ago. Most of the ~~left~~ left
over left and many
very large trees are
scattered all along the
ridge as emergents
from the main canopy
layer. There are trunks to
~~1.5 m~~ 1 m - 1.5 m. dbh., perhaps
some more.

The lower part of
the ridge was partially
logged off 30 years ago.
There are some scattered
really large buttressed
trees. A fair canopy
with top at about 30 m.
of light requiring *Phoea*
about 3-4 dm. dbh. In
indistinct lower layer
at 6-10 m. Ferns and
shrubs fairly common, and

many climbers which become more abundant up the slope.

On the ridge top in the lower part the forest is rather poor and open forest, though with some large trees. An acaulescent caespitose palm, *Eugeissonia* with the habit of *Nyssa*, and very spiny petioles is abundant along this ridge and to a lesser extent on the slopes below. In places it reaches 5-6 or even more m. tall. It makes up half or more of the shrub layer in most places, and almost all of it in the sparser areas on the lower ridge top. Here in some areas the upper story trees do not even approach each other, but usually they are closer. Landon says that the sparseness is probably due to the presence of the palm, the litter of which may have a deleterious effect on the soil, as they find it difficult to get trees started, artificially in soil under these palms.

The first *Shorea curtisi* is at about ~~to~~ 350 m. which indicates Lymington's "hill dipterocarp forest". It is fairly common from here up to 500 m. (and probably farther up).

The ridge ascends gradually and has generally a rather wide top 50-75 m. or more, in places narrower.

Above the sparse part that was somewhat logged the hill dipterocarp forest becomes rather good. The ~~so~~ main canopy is fairly ~~good~~ complete at about ~~to~~ 30-40 m. with emergents up to ~~to~~ ^{50 m.} and even taller. The larger trees are up to 1.5 m. dbh or more. Spacing of canopy trees is from 10 to 20 m. There is an uneven lower story 10-20 m. high, rather well-marked, in places.

The shrub layer is mostly *Eugeissonia*, but with some other shrubs. On the ground there is, where the *Eugeissonia* is not too thick, a good abundance of seedlings of *Shorea*.

These vary in size from those of this year. ~~30~~ 10 cm or so tall, to older ones to 0.5 m. These latter correspond to places where more than usual light gets in. The seedlings, according to Landon, can live for up to 5 years in a semi-dormant condition, shooting up if a tree falls and lets in light.

The holes made in the forest by fallen trees are very impressive. Some seen must have been 30-50 m. long and 15-20 m wide. Trees are said to fall even on very still days, such as today. One was heard at a distance. The holes persist for a long time if no seedlings are present to fill them. Landon says there may be a good seed year every 2-5 years.

The trees making up the emergent and main canopy layer belong mainly to the following genera:

Shorea
Dipterocarpus
Koompassia
Anisoptera
Hopea
Nothopetalum (allied seen, 80 m.?)
Campnospermum
Sindora
Gluta
Melanolepis
Evodia (glabra)
Palagium
Dyera (glutosa)
Main story, not emergent:
Eugenia
Dillenia
Calophyllum
Myristica
Canarium
Sapreum
Sandophyllum
Lauraceae (one or two spp.)
Endospermum

One tree of *Agathis alba* at about ~~400~~ 350 m. first one seen in this region at such a low elevation.

On the slope (25-30°) below the 1600' point on the ridge is a plot laid out in 1948 by Wyatt-Smith for detailed study of a virgin rain-forest. In this 5 acres every tree over 4" is numbered, plotted on a diagram, measured every two years, records kept of flowering, etc. The plot is divided into 1 chain squares, basal area worked out for each of them. Found that maximum basal area seems to be about 180-200 sq. ft. per acre. Growth is rapid up to this, then slows or stops till a tree falls. This is figured to be the maximum the soil can support.

The average number of trees per acre is about 200. The average number of species is about 100 per acre. In the 5 acres there are about 200 species. This does not include those under 4" diameter.

In this plot the trees are generally smaller than on the ridge. Landon says they are usually smaller on the slopes than either on the ridge or in valley bottoms.

The ground layer has a few ferns and Selaginella, a few seedlings.

The shrub layer has *Eugenia* common but not nearly so common as on ridge. There also is a sparse stand of slender shrubs of other sorts. This layer from 1-5 m. high. The large trees are spaced about 10-20 m. apart, but few are over 6 dm. dbh. Here and there are rather closely spaced groups of larger ones. The main canopy is at about 30-35 m., is rather open and uneven, and is of mostly of trees about 3 dm. dbh.

Between the shrub layer and this is a rather vague layer or understorey between 10 and 20 m., rather dense but grades into main canopy.

There are some enormous lianes but they are not abundant. Some small rattans. There are rather few epiphytes.

It is easy enough to walk through without cutting, being only careful

196

1956

Malaya

of spiny rattans and
Eugenia species.

Considerable light comes
 through in most places.

In general, in this hill
 dipterocarp forest, the canopy
 is rather loose, the layering
 is not very definite or
 easily made out, there
 are about 5-15 big trees
 per acre. (The foresters hope
 to have 25-30 in next generation)

Belangor

197

April 19 - insects in
 bottle #2 collected around
 lights at Forest Research
 Institute resthouse,
 Belangor, near Kuala Lumpur.

14 200

